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PREFACE

THE purpose of this book is two-fold: first, to teach the underlying principles and construction of the mechanism of the sewing machine in such a manner that a teacher can operate any machine quickly and easily, tho she may never have seen that particular machine before; and, second, to stimulate interest in a wider and more complete use of the machine in clothing classes.

The day of the hand-made garment is long past, and the efficient worker is making use of the machine, not only for plain sewing, but for every type of work that garment-making requires. Why overhand lace when a little practice will enable one to use a device that not only sews on the lace, but hems the edge as well?

In order that the school work shall "carry over" to the best advantage in the home, it is firmly believed that a sewing laboratory should be equipped with as many makes of sewing machines as possible, and, in any event, that each type of mechanism should be represented. Not all homes use the same make of machine, and the student naturally wishes to operate a machine like that in her home. There is still another reason for the use of several makes of machine in the school laboratory. Every girl is a potential customer of some sewing machine company, and a knowledge of every standard make of machine should be a part of her general information. Again, since every standard make of machine has so many

points of excellence, and every manufacturer is firmly convinced that his machine is the best on the market, it is hardly fair to use one make to the exclusion of all others.

The chief objection to several types or makes has been the fact that teachers have considered it more difficult to teach beginners under such conditions than when the machines were alike. However, since *the order of threading is invariable, regardless of the machine,* it has been found by experiment that if, by degrees, beginners are taught treadling, paper-stitching, threading the upper part, etc., there will be little or no trouble experienced, and the pupil will, thru her own interest and initiative, use any and all machines in the room.

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Greist Manufacturing Company, New Haven, Connecticut.
New Home Sewing Machine Company, Orange, Massachusetts.
Standard Sewing Machine Company, Cleveland, Ohio.
Singer Sewing Machine Company, New York, New York.
Western Electric Sewing Machine Co., New York, New York.
White Sewing Machine Company, Cleveland, Ohio.
Willcox & Gibbs Sewing Machine Company, New York, New York.

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TABLE OF CONTENTS

CHAPTER I

History of the Sewing Machine

1. The First Sewing Machine.—If we were to ask a woman of the present day the purpose of the sewing machine, she would reply without hesitation: "Sewing pieces of cloth together; to make clothing, of course!" And so it is with surprise we find that the ideas and principles now incorporated in our sewing machines were first used on machines for embroidery and leather work.

Kent in his *Seven Wonders of the Modern World* says that a London mechanic of German origin, named Weisenthal, took out a patent on June 24, 1750, for an embroidering machine. This machine used needles pointed at each end and with an eye in the middle, and a thread carrier employed in a very clever manner. This appears to have been the first invention of a mechanism to take the place of the hand and needle, or, at least, is the first recorded attempt.

In 1790 Thomas Saint of England invented a machine to stitch on leather, but it embodied many of the features of the modern sewing machine. It was constructed with an upright post with an overhanging arm at right angles. The needle, with an awl parallel to it, descended vertically; the awl, proceeding in advance of the needle, pierced a tiny hole in the leather. The needle was *notched* at the lower end and thrust the thread thru the material, leaving a small loop which was interchained with the preceding stitch. The thread was tightened in the material by means of a spindle, which reached down from the protruding beam at a point midway between

the thread spool and the needle and awl carriers. A horizontal feed plate was used; also an intermittent automatic feed motion. This invention for some reason was lost for more than two generations.

We next find that letters patent was granted to John Duncan on May 30, 1804, for a much less comprehensive machine, but which forecast the use of an eye-pointed needle, and, later, to James Winter for certain improvements on sewing machinery, chiefly relating to the facilitating of sewing leather gloves. No other English inventions or patents are recorded for more than a quarter of a century.

In 1830, a Frenchman named Thimmonier invented a chain-stitch machine which was so far successful that ten years later he had about eighty machines in operation, making uniforms for soldiers. Angry journeymen tailors destroyed the machines and models, and Thimmonier barely escaped with his life. He made a second attempt and again succeeded in assembling a working model, but this was destroyed by another mob, and he died a few years later heartbroken and penniless. To Thimmonier belongs the distinction of having produced the first machine whose sole purpose was that of sewing garments, and for the introduction of the use of the presser foot.

2. **Early American Sewing Machines.**—A report of the first American attempt at a sewing device was mentioned in a trade account which related that a patent for a "leather-sewing device" had been granted on March 10, 1826, to Henry Lye of Philadelphia. All particulars of the patent, however, were lost in the fire of 1836, which destroyed all U. S. patent records to that year.

In 1834, Walter Hunt, of New York, experimented with a sewing device, using a curved, eye-pointed needle, and accounts state that he applied for a patent, but was denied because he had allowed too long a time to elapse between the completion of work on the invention and his application for a patent.

And thus it happens that Elias Howe, Jr., is commonly supposed to have invented the first sewing machine. Nor is the honor entirely misplaced, for while the patent of Howe's machine was not granted until 1846, it was the first machine to be successful enough to come into general use, and it was also the first invention which used two threads.

FIG. 1. Elias Howe, Jr.

Elias Howe, Jr., (Fig. 1) an American, was born in 1819 in Spencer, Mass. At the age of twenty, he went to Boston to work for Ari Davis, an eccentric mechanic, whose business was repairing and inventing machinery. One day he heard Mr. Davis say to two inventors who had come for help on a knitting machine, an invention of their own: "Why do you bother with a knitting machine when the inventor of a sewing machine would become a millionaire in a short time? Why!" exclaimed the boastful Ari, "I could invent one over night." Howe, an ingenious mechanic and in dire need of money, was fired with the idea, and at once began planning such a machine.

His first efforts were unsuccessful, due to the fact that his idea was based upon the use of a common sewing needle, pointed at both ends and having an eye in the middle. It finally occurred to him that a mechanism need not necessarily be based upon the hand method, and that two threads instead of one might be used. With this new idea in mind, he went to work with renewed energy, and succeeded so well that in 1844 he had a new wooden model ready. This invention used two threads—an upper, or needle, thread, and an under, or bobbin, thread. The under thread passed thru the loop of the needle thread, making an interlinking stitch, thus giving the name of "lock-stitch" to all two-thread machines.

The needle on this machine was placed in a horizontal position, and the cloth held vertically by means of pins protruding from a thin steel ribbon called a "baster plate" (Fig. 2). This baster plate was moved forward intermittently by a toothed wheel. When the end of the plate was reached, the machine was stopped and the "baster" returned to its original position. There was also a device for drawing up the thread and tightening each stitch.

FIG. 2. The first lock-stitch machine.

Howe's first piece of work upon the completion of his working model was the stitching on two suits of broadcloth—one suit for the friend whose financial aid had made the machine possible, and the other for himself.

It is related that much skepticism of the invention was shown, and that Howe once entered upon a wager to do as much work as five expert women in a given length of time. The work was laid out and the five women and Howe started to work. Howe not only finished the work required, but in much less time than it took the women to finish their allotment.

Altho Howe was granted a patent in 1846, owing to financial difficulties it was several years before he was able to manufacture his machine or to realize any profits from it.

In the meantime a patent had been granted to two Englishmen—Newton, and Archbold—for a sewing device which produced a chain-stitch and made use of an eye-pointed needle. While the patent was granted in 1841, there seems to be some question as to the credit for the eye-pointed needle belonging entirely to these inventors.

In 1849, Allan B. Wilson, another Massachusetts inventor, produced a second sewing mechanism. His invention used two threads, but the method of forming the stitch was entirely new. Howe made use of a boat-shaped shuttle and a long bobbin, which was placed in a horizontal position, and swung back and forth, or vibrated, as each stitch was formed. Wilson used a round bobbin in a stationary case, and placed it in a vertical position with a rotating hook which carried the needle thread around the bobbin.

He was thought by many to have known of Howe and his invention, but subsequent events proved that they were in entire ignorance of each other's efforts.

Some years later a Virginia farmer named James E. A. Gibbs invented another chain-stitch machine. His invention

came about in this way: One day, while reading a paper, his attention was attracted by the picture of one of Howe's machines. Only the head was shown, and the article accompanying the picture gave no information beyond the fact that it could sew seams. Gibbs was of a mechanical turn of mind, and immediately began to wonder what the under part was like, and what took place after the needle pierced the goods. Altho Gibbs' conclusion that only one thread was used was erroneous, he succeeded in inventing a mechanism called a looper, which caught the thread from the needle as it ascended and held it in a loop until the needle made the next descent, thus forming a series of interlinking loops upon the under side of the seam (Fig. 3).

FIG. 3. The original chain-stitch machine invented by James E. A. Gibbs.

Soon after Howe had succeeded in establishing himself and interesting the public in his invention, a German-American by the name of Isaac M. Singer made a trip to Boston in the interest of an invention of his own. While there he heard of Howe's wonderful machine and went to a shop where he saw one working. About 1850 he placed a sewing machine on the market which he claimed to be his own. The Howe Sewing

Machine Co. immediately brought suit against him for infringements and was sustained, even tho Singer carried the suit into the Supreme Court.

Altho the courts did not sustain Singer in his first claims, there can be no doubt of the value of the patents which were later granted to him. We find that in August, 1851, he was granted a patent for a sewing machine which had a vertical needle movement, driven by a rotary overhanging shaft, and a roughened feed wheel extending thru a slot in the table. A yielding presser foot held the work in position against the wheel feed. Motion was provided to the needle arm and shuttle by means of gearing (Fig. 4).

FIG. 4. The first Singer sewing machine.

During the next few years, we find that patents were granted to him for a chain-stitch machine, eleven patents covering improvements on the lock-stitch, reciprocating shuttle machine, three for the lock-stitch vibrating machine, a tension device, an embroiderer, a binder, a ruffler, a tucker, and a sewing machine having an oscillating shuttle.

The following tribute is paid Isaac M. Singer in a recent historical sketch published by the Singer Company, and seems so fair and just, that it is quoted here verbatim:

"The patented features of Singer's invention showed no wide departures from the developments of earlier inventors.

It was the practical adaptation and utilization of his own and other ideas that marked his inventions, some of which were not fully appreciated when they might have been patented, but were neglected. As an example, the combination of the rotary shaft in the overhanging arm; also the rocking treadle. Both of these are now dominant in sewing-machine construction.

"The ground floor of sewing-machine invention was established before Singer came on the field. It was too late for original dominant patents, but his clear perception of other men's work which was at hand led him in the line that succeeding invention was to follow."

In the meantime, improvements and new inventions were being made; also new companies were being formed. Inventors were suing each other to such an extent that there were representatives of seven different companies in Albany at one time, each with one or more suits for infringements to prosecute or to defend.

One of these representatives, more cool or with more wisdom and far-sightedness than the others, proposed that they combine and pay royalties to each other for those inventions which they used. Howe was afraid the combination would result in a restraint of trade, and consented only after a stipulation was made whereby new companies were allowed to manufacture under contracts paying tribute to the original inventors pro rata for those inventions used. The result proved the wisdom of the stipulating clause, for at one time there were over thirty of these contributing companies all doing a flourishing business.

CHAPTER II

Types of Sewing Machines and Their Mechanisms

3. Chain-Stitch Machines.—As we have seen in the story of the development of the sewing machine, there are two ways by which stitching may be done—with one thread or with two—and so we have two classes of machines. We speak of the machine using a single thread as a chain-stitch machine, because of the chain-like appearance of the stitches upon the under side of the material, and because each stitch is interlinked with the preceding stitch (Fig. 5).

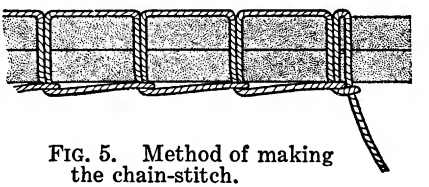


Fig. 5. Method of making the chain-stitch.

The stitch is formed by means of a looper which operates under the plate and directly under the point of the needle. The looper may revolve in a complete circle; when it does, we say that it rotates. Or it may swing back and forth on a half circle; then we say that it oscillates. As the looper rotates or oscillates, it catches a loop of thread from the point of the needle, which has pierced the material and is ascending for the next stitch. The loop is held until the next descent of the needle, when it slips off over the new loop, thus joining the series of interlinking loops or stitches.

4. Lock-Stitch Machines.—When two threads are used on a machine, it is classified as a lock-stitch machine, again taking the name from the way in which the threads are interlinked in the material in the formation of the stitch.

In this case, the work is done with one thread on the upper side of the material and one thread on the under side. The upper thread is carried thru the cloth by the needle and is then passed around the bobbin thread. The threads are tightened, thus locking the two threads in the material in such a manner that they cannot be separated or unraveled without cutting or breaking (Fig. 6).

Before we describe the mechanism used in forming the lock-stitch, we must divide this class further into parts since there are three methods by which the lock-stitch is formed, and each method has its own distinct underlying characteristics or principles. We speak of these divisions as types, each type taking its name from the manner in which the mechanism works while forming the stitch. The three types are known as (*a*) the vibrating, (*b*) the rotating, (*c*) the oscillating.

In the vibrating type, the upper thread is carried thru the cloth to the under side, where a loop is formed as the needle begins its ascent for the next stitch. The under thread,

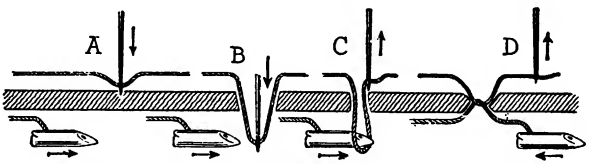


FIG. 7. Diagram illustrating motion of the vibrating shuttle.

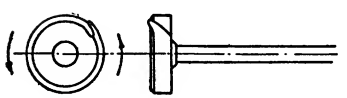


FIG. 8. Diagram illustrating motion of the rotating shuttle.

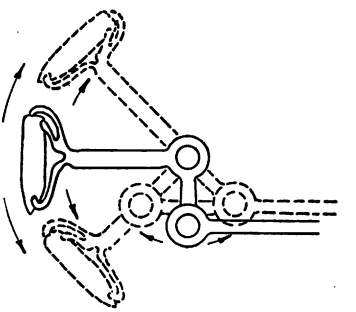


FIG. 7a. Diagram illustrating method of forming stitch with vibrating shuttle.

wound on a bobbin, is passed *thru* the loop; then it returns to the starting place. Thus the mechanism which carries the bobbin moves back and forth continuously and is called vibrating (Figs. 7 and 7a).

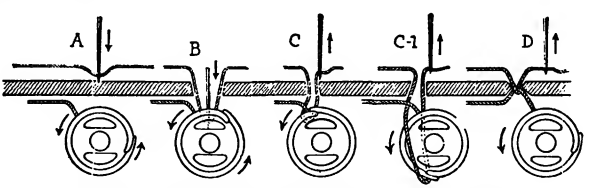


FIG. 8a. Diagram illustrating method of forming stitch with rotating shuttle.

In the rotating type, also, the under thread is wound upon a bobbin, but in this case the bobbin remains stationary inside

a circular piece of steel which revolves or rotates around it. There is a point on one side of this circular piece of steel which is called a hook. The needle carries the upper thread to the under side of the material, and just as it begins to ascend, this hook on the revolving piece of steel catches the thread and carries it *around* the bobbin. Thus, the upper and under

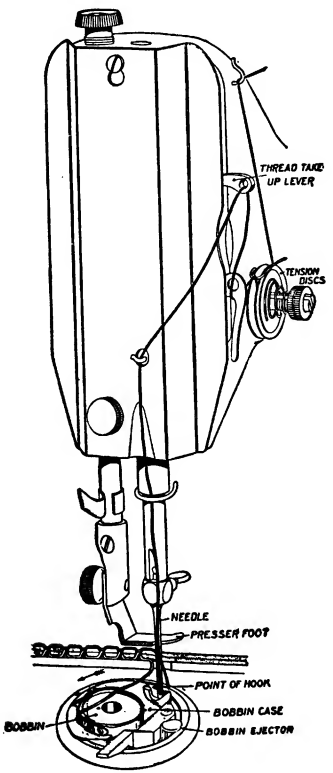


FIG. 9. Illustrating the method of forming stitch with the oscillating shuttle.

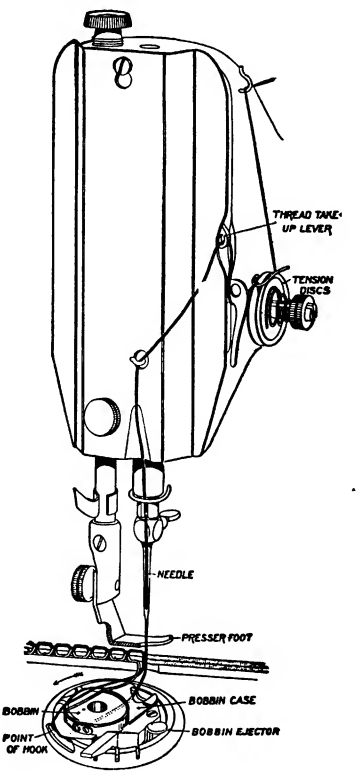


FIG. 9a. Illustrating second step in forming stitch.

threads are interlinked as before, but the *bobbin* is stationary and the under thread is carried *around* the upper thread by the *revolving* hook (Figs. 8 and 8a).

In the oscillating type, the bobbin is stationary and a cir-

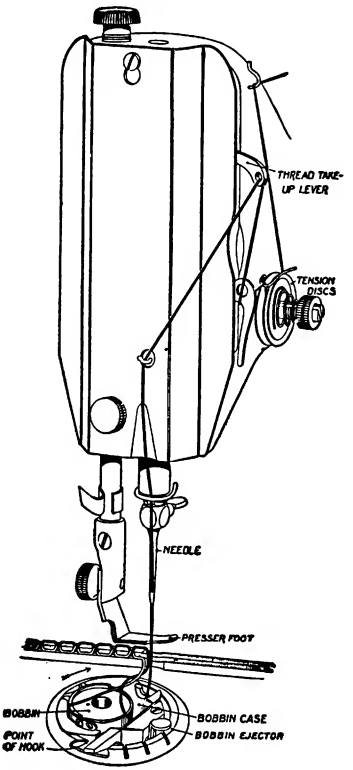


FIG. 9b. Illustrating third step in forming stitch.

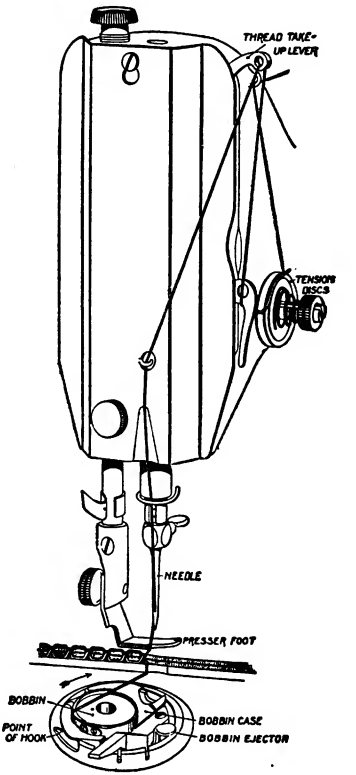


FIG. 9c. Illustrating fourth step in forming stitch.

cular piece of steel with a hook surrounds it. This piece of steel swings back and forth in a half circle around the bobbin, and as the needle begins to ascend, the hook catches the

upper thread and carries it half way around the bobbin, where it drops it. The hook swings back to its first position and the thread completes its journey around the bobbin as the needle draws it up in its ascent (Figs. 9, 9a, 9b, 9c).

It will be necessary to study the diagrams in Figs. 7, 7a, 8, 8a, 9, 9a, 9b, and 9c carefully in order to understand the principles developed in each type, but once these methods are

FIG. 10. Mechanism of the White vibrating machine.

clearly comprehended, the differing mechanisms used by the various machine companies will be easy to understand.

Note.—It is suggested that after the reader has studied the diagrams, she read the description of the mechanism and then turn back the head of her machine, and with diagram and illustrations before her, locate each part, and by turning the balance wheel, see the relation of the parts to each other.

The points in favor of the chain-stitch are these: (*a*) The elasticity of the stitch, (*b*) the automatic tension which requires no change for variation in thickness of fabrics, (*c*) the

ease with which stitching can be removed, and (*d*) because it is considered by many to be the simplest form of a sewing mechanism.

The points in favor of the lock-stitch are these: (*a*) Strength and durability of stitch, (*b*) a stitch alike on both sides, which enables the worker to stitch on either side of the work as convenience demands, and (*c*) no special care required for the fastening of threads.

FIG. 11. Mechanism of the New Home vibrating machine.

5. The Vibrating Shuttle Machine.—The vibrating type (Fig. 7) uses a long boat-shaped shuttle which rests in a shuttle carrier, *4* (Fig. 10), and swings back and forth with regular strokes, being pivoted as in Fig. 10. The shuttle swings horizontally a distance of about three inches and makes two dead stops in the formation of each stitch, one at each end of the stroke. With each forward movement of the shuttle, it passes thru a loop of the upper, or needle, thread, which is brought down by the needle. As the shuttle swings on its backward stroke, the loop is drawn up by the needle and the take-up, taking with it an interlinking loop of the

bobbin thread, thus forming a stitch. The mechanism which controls the motion of the shuttle may vary greatly in size and shape. On some machines it is extremely simple and on others much more complicated (Figs. 10 to 13), but the principle is the same in all cases.

FIG. 12. Mechanism of the No. 127 vibrating Singer machine.

The shuttle carrier (Fig. 20) is attached to a rod called the shuttle pitman (Fig. 20), and *12* (Fig. 10), which is pivoted at such a point between the carrier and its junction with the arm-rock shaft, as will produce a satisfactory balance in the mechanism. This accounts for the variation in the vibrating mechanisms used by the different sewing-machine companies. The arm-rock shaft (Fig. 20) is again connected with a feed cam (Fig. 20), which transmits the motion to the pitman and bobbin.

While the vibrating mechanism is a simple one, easily understood and requiring little care, it has two decided disadvantages—first, the loss of time and motion caused by the stopping and starting of the shuttle carrier, and, second, the noise of the shuttle in the carrier.

Now that motors are being used to such a great extent on

sewing machines, it is well to remember these disadvantages, and not to use a motor on this type of machine.

6. Rotary or Rotating Hook Machine.—The rotating hook is a flat steel device which revolves or rotates in one direction around a stationary bobbin (Fig. 8a). The hook

FIG. 13. Mechanism of Model D, Davis vibrating machine.

catches the upper thread from the point of the needle as it reaches the lowest point in its descent, and carries it around the bobbin case, enclosing the bobbin thread. The stitch is completed when the needle and the take-up have been raised to their highest point and the threads are drawn tight in the fabric.

The bobbin is usually placed in a bobbin case (Fig. 23) which, in turn, is placed within the circular piece of steel, which may be spoken of as the rotating hook (Fig. 23), or the rotating shuttle. The shuttle (or hook) is fastened into the shuttle race (or case holder) (Fig. 23), which is shaped to fit the shuttle carefully, and is permanently fastened to the rotating hook shaft (Fig. 23). The shaft is connected with the rotating hook shaft crank, and that, in turn, with the crank connecting rod (Fig. 23), from which the hook gets its

motion. The mechanism which holds the bobbin, shuttle and case, is, with one exception (the new electric Singer No. 101) placed in a vertical position.

The rotating type (Figs. 14 to 17) corrects the disadvantages of the vibrating type, as there is a continuous and smooth action of the rotating hook around the bobbin, and since the bobbin case is placed in a stationary position, there is very little noise. It will also be noted that any jar resulting from the stopping and starting of the shuttle is done away with, thus saving wear on all parts of the machine.

FIG. 14. Mechanism of the Standard rotary machine.

FIG. 15. Mechanism of the New Home rotary machine.

This is the best type of mechanism to be used with a motor. This point is supported, not only by the above facts, but by the fact that all modern power machines used in the manufacture of clothing are built on the rotating principle.

FIG. 16. Mechanism of the Eldredge two-spool rotary machine.

7. The Oscillating Hook and Shuttle Machine.—The reader will have already noticed from the description given of the oscillating type that it combines features of both the ro-

FIG. 16a. End view of the Eldredge two-spool rotary machine.

FIG. 17. Mechanism of the Domestic 69 rotary machine.

tating and the vibrating principles, in that the bobbin remains in a stationary position with the upper thread carried around it, as in the rotating type, and that the circular hook makes two dead stops in the formation of each stitch, as in the vibrating type. It would thus appear that while the noise of

the bobbin in its shuttle is eliminated, the lack of efficiency noted in the objection to the vibrating type still remains. The mechanism which forms the stitch on the oscil-

FIG. 18. Mechanism of the No. 66 oscillating Singer machine—horizontal position.

lating type may be placed in a horizontal (Fig. 20) or in a vertical position (Fig. 22). In either position, the mechanism is so similar to that of the rotating type that a study of Figs. 21

FIG. 19. Mechanism of the No. 15–30 oscillating Singer machine—vertical position.

and 22 and Figs. 18 and 19 will give ample information. It should be noted, however, that the oscillating mechanism may be placed in either a horizontal or a vertical position (Figs. 18 and 19); and that when used in a horizontal position,

it is called the "oscillating hook," and when used in a vertical position, it is called the "oscillating shuttle."

8. **Standard and Stenciled Machines.**—There are two classes of sewing machines—standard and stenciled. A standard machine is one which carries the manufacturer's name and serial number upon it, and the price is usually a fixed one. This means that wherever a machine is sold, whether thru an agent or direct from the manufacturer, the company will stand back of the sale. When the parts are broken, or worn, new ones can be had without loss of time and at a minimum of expense. On the other hand, a "stenciled" machine is one which is made in wholesale lots for a retailer, and does not carry the name of the manufacturer. It may carry the name of the retailer, but more often it has a name made for the purpose which has little or no meaning. These machines sell for a much smaller price than do standard machines, which is only fair, for repairs or new parts are always difficult to obtain. The difficulty is due to the fact that orders do not go directly to the manufacturers, and that stenciled machines are made in comparatively small lots and new parts seldom kept on hand. The retailer may at any time give up that line of business or change his orders from one company to another, in which case it is very difficult to obtain new parts or repairs.

The serial number may be stamped upon a plate and attached to the base of the upright of the head, or may be stamped on the machine itself. On the Eldredge vibrating, the number is under the slide which covers the bobbin. On the New Home, it is stamped on the front edge of the metal floor plate which supports the head. Sometimes the serial number is stamped upon the shuttle cover slide.

CHAPTER III

The Parts of a Sewing Machine

9. Operating Mechanism.—The principal parts of the mechanism of a sewing machine are essentially the same on all machines, tho the location and the shape may vary on the machines manufactured by different companies.

It is necessary for the operator to know the important parts of a sewing machine and to understand the function of each and its relation to the other parts (Figs. 20 to 23).

The drive wheel, or *bandwheel* (Fig. 24) is the large wheel placed to the right and under the machine table, and is connected to the *treadle* (Fig. 24) by a rod called a *pitman* (Fig. 24). It is also connected by a belt to a smaller wheel called a *balance wheel* (Fig. 20), which is placed above the table.

The balance wheel turns either to the back or to the front according to the make and type of machine, most rotating and oscillating machines turning to the back and all vibrating machines to the front. Some exceptions are noted, however —the 66-1 oscillating Singer turns to the front, and the rotating Eldredge, Davis, and Domestic turn to the front. The balance wheel makes one full revolution for each complete stitch, and three to five revolutions to one complete revolution of the drive wheel, depending upon the ratio maintained between the balance wheel pulley and the drive wheel.

A *dress guard* (Fig. 24) is placed around the drive wheel, while to the rear and over the drive wheel is a *belt guide*. On some machines there is a belt shifter to unbelt the

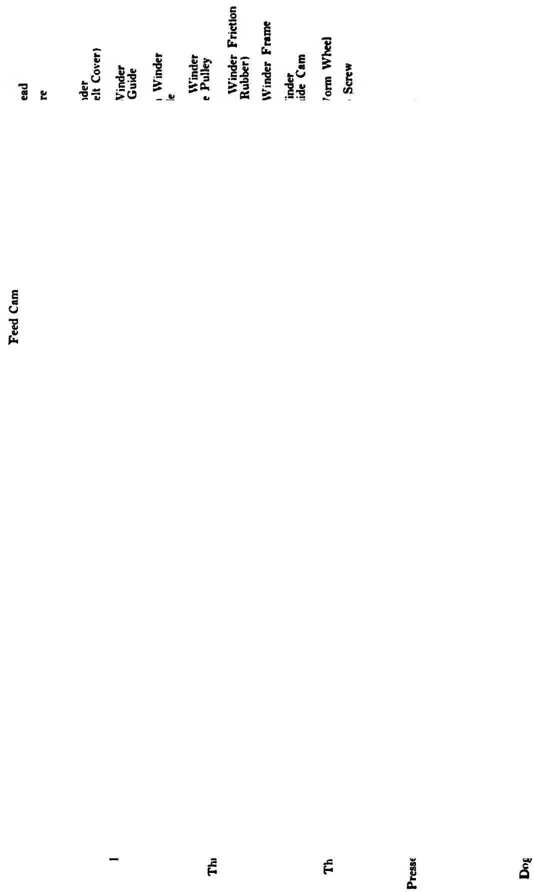


Fig. 20. Names of parts on head of vibrating Singer.

FIG. 21. Names of parts on head of Singer oscillating hook.

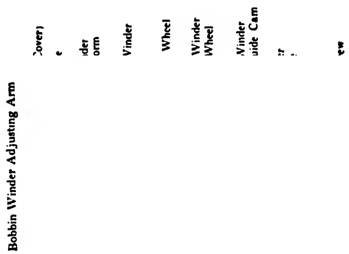


FIG. 22. Names of parts on head of Singer oscillating shuttle.

FIG. 23. Names of parts on head of Singer rotating hook.

FIG. 24. Illustration showing names of parts on the stand of a machine.

machine before closing, but if the head is raised and lowered automatically, this is omitted.

10. The Head. —The part of the machine above the table is called the head (Fig. 20). It is divided into three parts — (*a*) the upright at the right-hand side, (*b*) the arm, and (*c*) the face at the left-hand end. Attached to the upright are (*a*) the balance wheel, (*b*) the bobbin winder, and (*c*) the stitch regulator.

FIG. 25. Position of the bobbin winder and stitch regulator on Singer machines.

11. The Stitch Regulator.—The stitch regulator, or regulating screw, may be placed upon the upright (*A*, Fig. 25), or at its base (Fig. 26). The purpose of the stitch regulator is to lengthen or shorten the stitch. The stitch should be regulated to suit (*a*) the quality of the material, (*b*) the size of the thread used, and (*c*) the type of garment. Turning to the right increases or lengthens the stitch. On some machine the regulating screw slides

FIG. 26. Position of the stitch regulator on the Eldredge rotary machine.

in a groove (Fig. 27); on others it is a lever which can be moved without being unscrewed (Figs. 28 and 29). On all

FIG. 27. Position of the stitch regulator, bobbin winder, and loose pulley on the Eldredge vibrating machine. Loose pulley takes the place of the stop motion on this machine.

machines, with the exception of the Singers 66-1, 15-30, 115-1 and 127-3, there is an index plate to aid in regulating the size of the stitch, but the above directions for regulating applies to these as well as the others.

The stitch-regulating thumb-screw, or lever, is attached to the feed forked connection, then to the feed rock arm, or feed connection (Figs. 20 to 23), which, in turn, is connected with the feed bar spring and feed bar, or dog (Figs. 20 to 23).

12. Bobbin Winder.—The *stop motion* and the *bobbin winder* are important parts on all machines. The stop motion (*I*, Fig. 30) is an attachment in the form of a screw, or lever, placed upon the balance wheel and used to release it from the balance-wheel pulley and permit the pulley to run free while the bobbin is being wound. Sometimes there is a loose pulley (Fig. 27) which runs with the balance wheel, and this pulley is connected with the bobbin winder by a belt. In this case, the pulley is freed by reversing the motion of the balance wheel, and turning the pulley to the back. If the screw device is used, turn to the left, or front, to loosen or free the wheel or pulley, and turn to the right, or back, to tighten or connect. If a bar is used, it is simply lifted out of its slot and then replaced after the bobbin is filled.

FIG. 28. Position of the stitch regulator and bobbin winder on the White rotary machine.

The bobbin winder varies little in position since it is always placed upon the upright at the right-hand end of the head,

and is always placed in such a position that it can easily be brought into contact with the belt. The bobbin winder is a simple mechanism (Figs. 25, 27, 28, 29, 30) arranged to hold the bobbin when thread is being wound upon it. It consists of a small grooved pulley which holds the belt when the bobbin winder is adjusted into position for winding. A cam is made with small teeth which fit into grooves upon the bobbin holder and is turned with it. To wind the bobbin, turn the bobbin winder against the belt, and slip the belt into the groove on the pulley; place the bobbin with the thread attached into the bobbin holder; then carry the thread thru the notches in the thread guide, and operate the treadle as usual. The bobbin is automatically filled with smooth, even rows of thread.

FIG. 29. Position of the stitch regulator and bobbin winder on the Domestic rotary machine.

13. The Tension.—The tension is a mechanism of the greatest importance, and its function is to regulate the delivery of the thread.

There are always two tensions—an upper tension, which regulates the needle thread, and an under, or shuttle tension, which regulates the bobbin thread. (The latter will be discussed with bobbins.)

The position of the upper tension varies according to the make of the machine (Figs. 31 to 36), and may be found on the arm of the head, as on the New Home (Fig. 32), or on the end face of the machine, as on the Singer No. 115-1 (Fig. 33), the White (Fig. 34), and the Eldredge (Fig. 36), or on the front face, as on the Domestic rotary (Fig. 31), the Standard, the Singer No. 66-1, the Free, and the Davis. On makes of machines not named, the position may vary according to the number of the machine or the type.

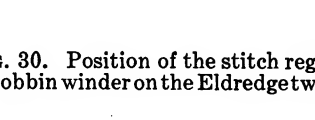


FIG. 30. Position of the stitch regulator and the bobbin winder on the Eldredge two-spool rotary.

FIG. 31. Position of the tension on the Domestic rotary machine.

There are two classes of tensions—the *automatic* and the *adjustable*, the latter being the larger class. All chain-stitch machines are equipped with the automatic tension; also, at present, one lock-stitch machine—the Eldredge rotary (Fig. 36). The commonest kind of adjustable tension consists of two small metal discs, or plates, with a wire spring, called auxiliary-tension spring, and held together with an adjusting

FIG. 32. Position of the tension on the New Home vibrating machine.

screw (Fig. 31). The Standard, the Singer, the Free, and the Domestic, all use this kind of tension.

The auxiliary-tension spring may be attached to the tension itself (Figs. 33 and 35), or be placed at a little distance as it is on the Eldredge (Fig. 36). The purpose of this little spring is to assist in the work of the tension. On three machines—the Singer 66-1 and 15-30 and the Domestic rotary 69—there is a third device used with the tension. This is a small curved bar of metal (Figs. 31–33), under which the thread is passed before being carried into the take-up.

Of the other kinds of tensions, the mechanism may consist of two narrow flat pieces of steel as on the New Home (Fig. 32), with the adjusting screw on top; or bell-shaped, with the adjusting screw on the outside center, as on the Eldredge (Fig. 36), or a flat bar of metal with the adjusting device on the front face of the head, as on the White (Fig. 34); but the purpose of the mechanism is always the same. *The method of adjusting the tension is also always the same,* no matter how the device may be made. The delivery of the thread thru the tension is regulated by the adjusting screw (*9*, Fig. 31; and Figs. 32, 34, 36), which is turned to the right to increase or tighten the tension, and turned to the left to decrease or loosen the tension, a half turn to one full turn being sufficient in most cases.

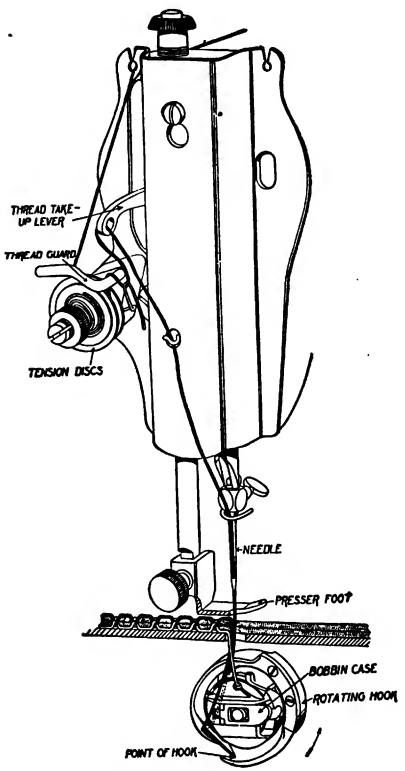


FIG. 33. Position of the tension on the 115-1 and 15-30 Singer machines.

With the exception of the tension on the New Home (Fig. 38), or any machine having the tension placed upon the arm, the tension is attached at the back to a bar called a tension

release lever, or disc (Figs. 21 and 37a), which is again connected with the presser foot bar and presser bar lift lever, so that the tension is automatically released as the presser foot is raised. This releases the upper thread and enables the operator to remove the material without trouble. The convenience of this arrangement is readily appreciated when one remembers that to remove the work from under the needle, extra thread must be released from the tension.

14. The Take-Up Bar.—The take-up bar, or the thread take-up lever, as it is sometimes called, may consist of a small curved bar, operating from the face of the machine (Figs. 31 to 36), or the work may be done by the needle bar, aided by two little interlinking wires on the face of the machine, which move in conjunction with the needle bar, as on the New Home (Fig. 32). The take-up bar varies little in position, being on the end face, or front face, of the head. The take-up bar serves a double purpose—first, with each *downward* motion it releases enough thread from the tension to form one stitch, and

FIG. 34. Position of the tension and regulator on all White machines.

FIG. 35. Position of the auxiliary tension spring on the White tension.

FIG. 36. Position of the automatic tension on the Eldredge machine. *E* shows position of the auxiliary tension spring.

with each *upward* motion it draws up the excess thread and tightens the interlinking upper with the under thread in the fabric. It will also be noted that the needle bar and take-up bar must work in conjunction, since they are attached to the same cam, and that no adjustment of the take-up bar is necessary. This cam (Figs. 20–23) is connected with the front end of the arm, or main shaft, and the opposite end is connected with the feed cam, from which the arm and, in turn, the thread take-up cam get the motion (Figs. 20–23).

FIG. 37. Presser foot bar and spring which controls the pressure.

FIG. 37a. Lever which raises the presser foot.

15. The Presser Foot.—The presser foot is attached to an upright rod, or bar, which extends up thru the face of the machine (Fig. 37) and is raised or lowered by a lever at the back or at the side of the foot (Fig. 37a). The presser foot holds the cloth firmly upon the feed (Fig. 37), the pressure being controlled by a wire spring coiled around the presser foot bar (Fig. 37). A screw at the top (Fig. 37, Fig. 21) adjusts the amount of pressure, which needs to be lessened if the material is heavy, and increased if the material is light in weight. Turning the screw to the right, increases the pressure, while turning to the left decreases it.

FIG. 38. Method of releasing the thread in the tension of the New Home vibrating machine.

The presser foot is divided into two parts, or clefts, which correspond with the divisions in the feed. It is usually a rigid piece of steel, but made yielding to the varying thicknesses of cloth by the use of the presser bar spring. Two machines, however, are provided with a presser foot that is hinged at the heel, and thus permit the foot to pass over heavy seams with still greater ease. This type of presser

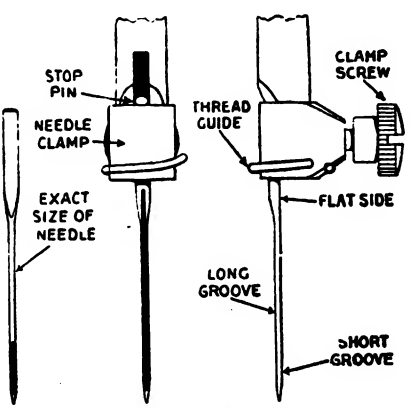


FIG. 39. Method of setting needle.

foot is used on the Davis rotary and the Singer electric 101. The Davis Company has also used another feed called a vertical feed, which was practically a feed within a presser foot, since the feed was attached to a bar set parallel to the presser bar, and having a feed which worked between the prongs, or clefts, of the presser foot.

Directions for the use of the presser foot as a guide in straight stitching will be given under directions for the use of the machine.

16. The Feed.— The feed, or feed dog, is a small oblong plate with teeth projecting up thru the throat plate directly under the presser foot (Figs. 20, 21). Its function is to carry the cloth to the needle and away from the needle as each stitch is made. In order to do this, it has an up-and-backward

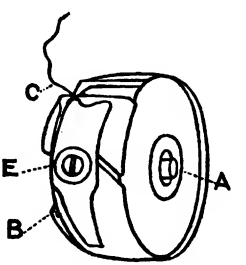


FIG. 40. Boat-shaped shuttle and bobbin used on all vibrating machines.

FIG. 41. Round bobbin used on all rotating and oscillating machines.

FIG. 42. Round bobbin case. *E* is a screw that regulates tension.

motion followed by a down-and-forward motion. The up-and-backward motion carries the cloth with the completed stitch away from the needle to the proper position for each succeeding stitch. It will thus be seen that each backward or forward movement of the feed is the exact length of one stitch, and that changing the length of the stitch by means of the regulating screw—feed-regulator thumb-screw (Figs. 25, 29)—merely changes the length of each movement or stroke, of the feed.

FIG. 43. Two-spool Eldredge. Spool of thread used instead of a bobbin.

The feed must also be timed to work in conjunction with the needle bar and the take-up lever in order to obtain a perfect stitch. The feed seldom, if ever, requires adjusting, but, if necessary, it can be removed by taking out the screw which holds it in place under the throat plate.

FIG. 43a. Another view of the Eldredge two-spool rotary.

Care should be exercised in the use of the machine that the teeth on the feed are not dulled or broken. *Never* stitch over pins in the work, for even if the needle is not broken, they still have the power to ruin the feed.

Never run the machine without a *double thickness* of cloth between the presser foot and the feed, and when the machine is not in use, do not leave the presser foot down on the feed without a fold of cloth between the presser foot and the feed.

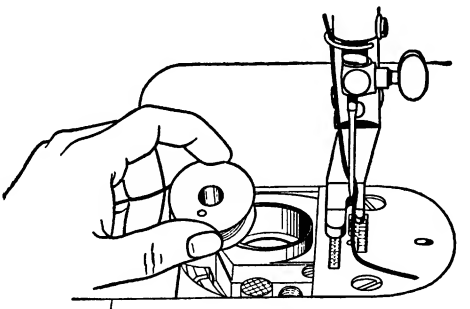


FIG. 44. The bobbin on the oscillating Singer 66–1 threads into a stationary case.

17. The Needle Bar.—The needle bar is placed parallel to the presser-foot bar in the face of the machine (Figs. 22 or 37). In most machines it serves the single purpose of holding the needle, but on the New Home (Fig. 32) and other machines having the tension on the arm of the machine, it serves as a take-up as well. When the needle bar serves the first purpose, it may extend half way up thru the face or may extend entirely thru the face; in either case, however, it must always be connected with the take-up cam since the take-up and needle bar work in conjunction with each other (Figs. 20, 23 and 37).

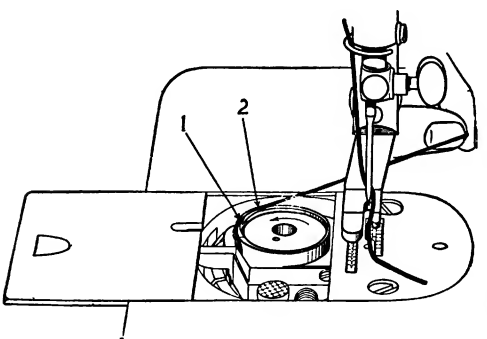


FIG. 44a. Complete threading of the oscillating Singer.

18. The Needle.—The needle fits into a small groove in the lower end of the needle bar, and is held in position by a small screw clamp (Fig. 39). Placing the needle correctly is very important, and the following directions, therefore, should be observed: (*a*) With the needle bar at its highest point, loosen the needle clamp screw (Fig. 39) enough to give room for the shank of the needle to pass up into the groove in the needle bar; (*b*) push the needle up until it touches (Fig. 39). If the need shank, the flat sid toward the right, but if the shank is round, then the needle should be placed so that the side having a groove from the base of the shank to the eye of the needle is at the *left*; while the side having

FIG. 45. The correct method of replacing the vibrating shuttle.

FIG. 46. Method of ejecting shuttle on vibrating machines.

the groove from the eye of the needle to the point is placed at the *right.*

Care should be taken that the needle is the correct one for the machine in which it is to be used. In case the correct needle cannot be purchased, a needle made for another machine may be used, *provided the length from the top of the shank to the eye of the needle is the same.*

19. Bobbins and Shuttles.—The under thread is wound upon bobbins which vary greatly in shape and size, according to the type of machine in which they are used. The vibrating type uses a long, shallow bobbin, which is carried in a boat-shaped shuttle (Fig. 40). The other types use a small, flat bobbin (Fig. 41) in a round bobbin case (Fig. 42). One company has just placed a machine upon the market which uses a spool of cotton instead of a bobbin (Fig. 43), thus doing away with the necessity of winding bobbins and the waste of unused thread when colors are changed. The No. 66-1 Singer has a stationary bobbin case, and the bobbin is threaded directly into the machine (Figs. 44 and 44a).

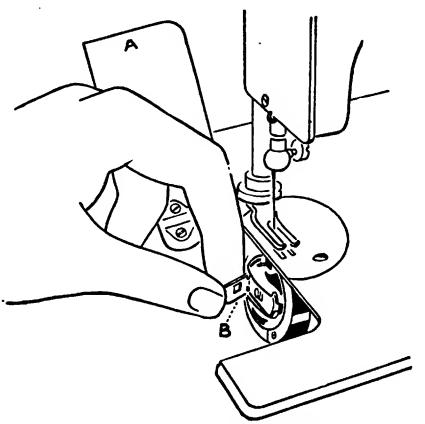


FIG. 47. Method of replacing the bobbin case on New Home rotary.

All shuttles and bobbin cases are provided with tensions to control the bobbin thread. On the vibrating shuttle, this is a

flat piece of steel nearly the length of the shuttle (Fig. 40). The upper end may be free or stationary, according to the make of the machine, but the lower end is fastened to the shuttle with a screw, which also adjusts the amount of tension. To increase the tension, turn to the right, and to lessen, turn to the left.

The round, flat bobbins used in the oscillating or rotating machines are threaded into a bobbin case (Fig. 42). The tension on this case is a flat curved piece of steel which fits the bobbin case snugly (Fig. 42). One end is stationary, and the other is fastened with a screw which regulates the tension. As on the shuttle, turning to the right increases the tension, and to the left, releases it. There is always a slit in the bobbin case for the thread to slip thru, and usually some other threading notch.

FIG. 48. Method of replacing the shuttle on the White rotary.

The spool of thread on the two-spool machine is provided with a case and tension like the others (Fig. 43).

The shuttle in all vibrating machines is placed in a shuttle carrier, the *flat* side of the point placed towards the *left* side of the carrier, and the point to the front (Fig. 45). It can only

FIG. 49. Method of replacing the spool case on the Eldredge two-spool rotary.

FIG. 50. Method of replacing the bobbin case on the Domestic rotary.

be lifted out or replaced when the carrier is in a position to the extreme front. It may be ejected by pressing a small button at the front (Fig. 46), or by pressing the point of the shuttle with the forefinger.

The round bobbin case is placed in position from the upper side of some machines, and from the under side on others (Figs. 47, 48, 49, 50), either being equally convenient. The bobbin case must be held with the bobbin to the *right* and turned so that the needle hole in the bobbin case is directly

FIG. 50a. Method of replacing the bobbin case on the Singer oscillating shuttle.

on *top*. It may be placed on a post or simply slipped into a socket. Nearly all round bobbin cases are provided with a latch or some arrangement with a spring which holds them in place. The latch is used as a handle in removing the bobbin case as well as a means of releasing the spring (*B*, Fig. 47).

CHAPTER IV

Preparing the Machine for Use

20. Threading the Machine.—Threading the machine is comparatively easy. It should be remembered that all machines require the same number of threading devices, and that the order is practically the same on all machines. There are

Fig. 51. Showing thread from spool directly into the tension.

wire guides which carry the thread from one device to another. The spool is placed upon the spool pin, and the thread may be carried directly into the tension (Fig. 51), or thru a wire guide (*1*, Fig. 52) into the tension, according to its position, but, in any case, the *tension* is the first important device to be threaded. Pass the thread between the tension discs (*2*, Fig. 52) and over the wire spring (*3*, Fig. 52) at the side (called by some the auxiliary tension spring). On some machines this spring is omitted (Fig. 51), while it is nearly

covered by the tension plate on others (Fig. 53). On the Singers Nos. 66-1, 15–30, and 115-1 (*3*, Fig. 54), the Domestic,

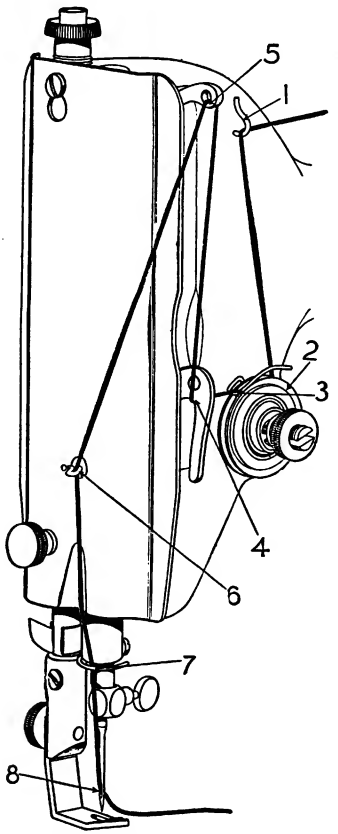


FIG. 52. Singer machine showing the use of wire thread guides and the thread smoother.

FIG. 53. Method of threading the White rotary.

and the Free, there is an extra bar, or guide, called a thread-regulator, or smoother. The function of this device is to assist in the work of the tension auxiliary spring and aid in a smooth delivery of the thread. The *take-up bar* (*5*, Fig. 52) is the next point of importance, and the thread is carried into it from the tension spring, or smoother, as the case may be. From the take-up

bar, the thread is carried thru wire guides—one or two (*6*, Fig. 52)—down to the eye of the needle (Fig. 52), thru which it passes from left to right.

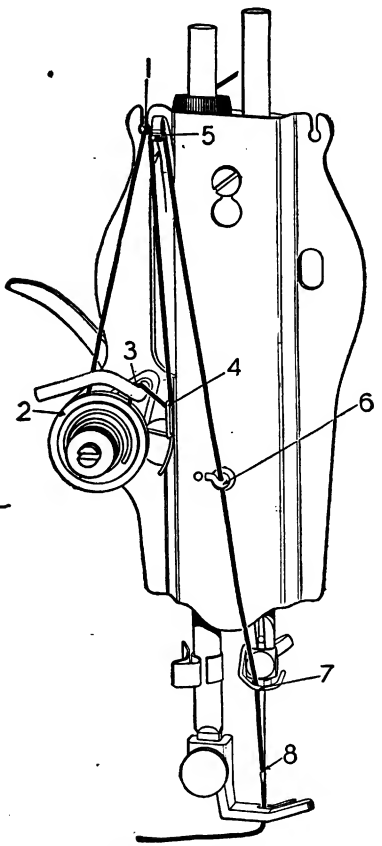


FIG. 54. Method of threading the Singer rotary and the oscillating shuttle.

FIG. 55. Method of carrying the thread from left to right across the front of the bobbin.

21. Threading the Bobbin Case or Shuttle.—The bobbin must always be wound with the same size thread that is being used on the top, the only exception to this rule being the use of heavy thread for cable stitching or when a coarse thread is used for gathering. The amount of thread which a bobbin carries varies according to the make of the machine, some containing only thirty yards, while others carry as many as one hundred yards.

The threading of the bobbin is of the utmost importance in order to get the proper tension on the under thread. When the boat-shaped shuttle is used, the bobbin is held so that the thread carries from left to right (Fig. 55) across the *front* of the bobbin, which is then slipped into the shuttle. Holding the bobbin firmly in the shuttle, the thread is carried thru a slit in the shuttle, and a firm downward pull, followed by a straight upward pull (*A*, *B* and *C*, Fig. 55a) completes the threading. These two motions carry the thread thru a little V-shaped notch in the tension. If the thread does not catch the first time, the

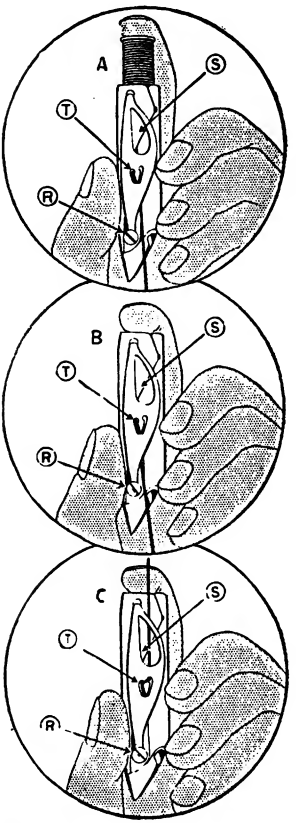


FIG. 55a. Complete method of threading the vibrating shuttle.

FIG. 56. Method of threading the bobbin case of the Domestic rotary.

downward and upward motion must be repeated. This repetition will sometimes be necessary when the thread is low on the bobbin.

To thread the round bobbin case, hold the bobbin in the

right hand with the thread unrolling toward the front (Fig. 56). Slip it into the case and carry the thread thru the slit and into the succeeding notches or eyes (Fig. 56a), if there are

FIG. 56a. Complete threading of bobbin case on Domestic rotary. Note tension.

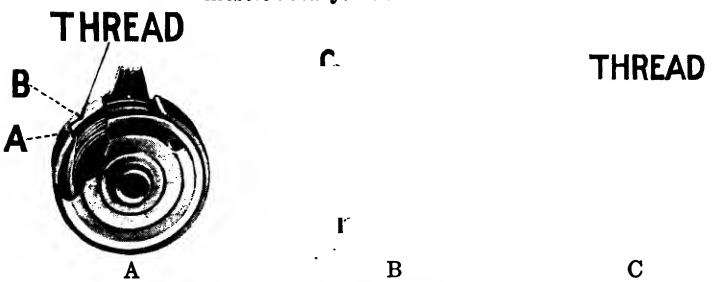


FIG. 57. Method of threading the White rotary bobbin case.

any, until it is in position. There will be no difficulty if the operator will carry the thread from right to left, being sure that the thread pulls *against the tension* (Figs. 57 to 60).

After the machine has been correctly threaded, the operator should hold the needle-thread loosely in the left hand, and turn the balance wheel once with the right hand. The needle will catch the bobbin thread and a loop will be brought up thru the plate (Fig. 61). *This loop must be drawn up and both threads placed to the back under the presser foot before stitching is*

begun. Unless this is done, an ugly knot is left at the beginning of the seams, or the threads may become caught in the shuttle race and cause still greater trouble.

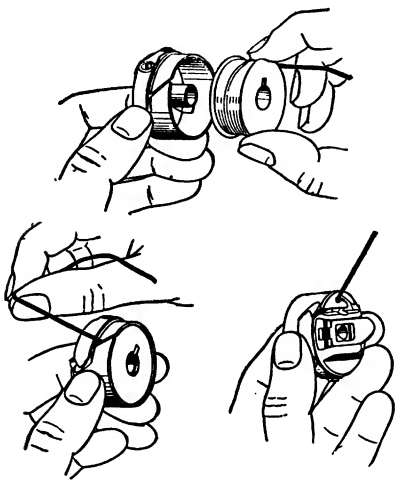


FIG. 58. Method of threading the rotary Singer bobbin case.

22. Regulating the Tensions (Figs. 62 to 66).—The amount of tension required for good stitching is determined by the size of the thread and the kind of fabric which is being stitched. Some demonstrators direct the operator to test by lowering the presser foot and pulling the upper and lower threads separately and together, one in each hand. This is not a satisfactory test, in that it requires a great deal of experience to be able to judge correctly, and, after all, the stitch must be regulated to suit the material that is to be stitched. Therefore, the best method is to fold a piece of the material and test by stitching on it.

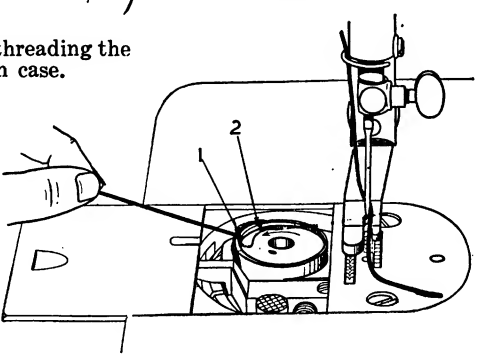
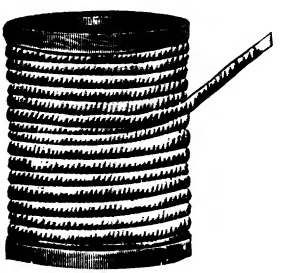


FIG. 58a. Method of threading the stationary bobbin case in the Singer machine.

A perfect stitch (*A*, Fig. 67) requires the same amount of tension upon upper and under threads in order that the stitch shall be alike on both sides, with the interlinking loops in the middle of the fabric.

If the thread lies straight along the upper surface of the material (*B*, Fig. 67), it may be caused by one of two errors. Either the upper tension is *too tight* or the under tension is *too loose*. If the thread lies straight along the under surface of the material (*C*, Fig. 67), it may be

FIG. 59. Method of threading the spool case of the Eldredge machine.



A B

FIG. 60. Method of threading the spool case of the Eldredge for embroidery cotton for cable stitching.

that the *under tension is too tight or the upper tension is too loose. In all cases, look to the threading of the upper and the under threads first.* In nine cases out of ten, it is a slight

variation from the threading directions which is the cause of the trouble. Secondly, test the upper tension, then the bobbin tension last.

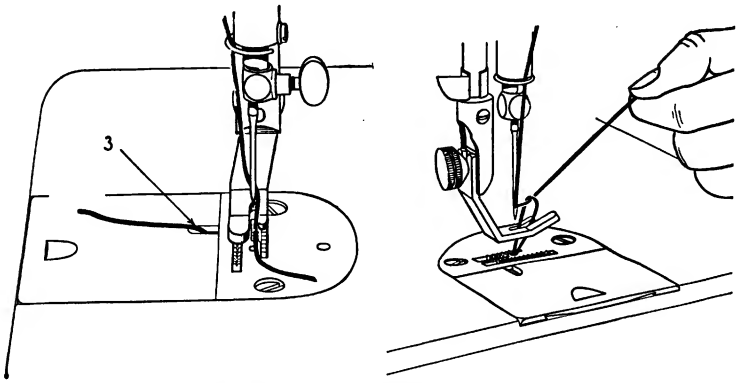


FIG. 61. Method of drawing the under thread up thru the needle hole in the throat plate.

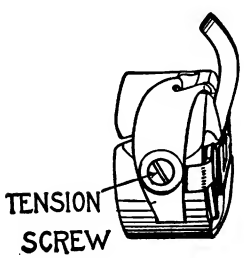


FIG. 62. Position of the tension-regulating screw on the oscillating shuttle bobbin case.

FIG. 63. Position of the tension-regulating screw on the bobbin case of the White rotary.

23. Uneven Stitching and Skipping Stitches.—Uneven stitching and the skipping of stitches is usually caused by a blunt or a crooked needle. To detect a bent needle, unscrew the needle and place upon a flat surface and see if the needle is parallel with the surface. If the needle has been

blunted, it may be sharpened upon an emery wheel, but care must be used to keep it to its original shape. Another reason

FIG. 64. Position of the tension-regulating screw of the bobbin case of the Domestic rotary.

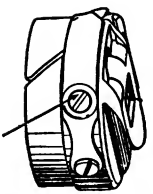


FIG. 65. Position of the tension-regulating screw on the bobbin case of the rotating Singer.

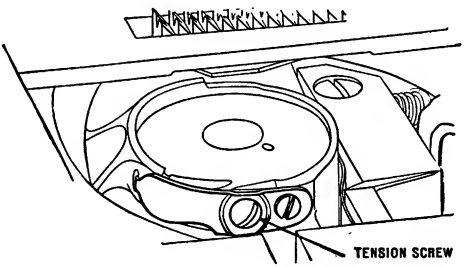


FIG. 66. Position of the tension-regulating screw on the stationary bobbin case.

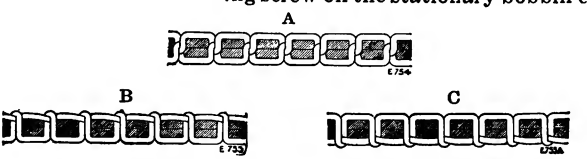


FIG. 67. *A* shows appearance of the stitch when both tensions are correctly regulated. *B* shows *upper* tension too tight, or *lower* tension too loose. *C* shows *under* tension too tight, or *upper* tension too loose.

for poor stitching may be due to the fact that the needle does not correspond in size to the thread in use. A third cause

may be that the needle has not been correctly set, the common trouble being that the flat shank of the needle is turned in the wrong direction.

The size of the needle may be indicated by a letter or a number, and as each machine has its own system, the table of relative sizes of needles and thread for each of the eight best-known machines is given herewith for the convenience of the reader.

DAVIS MACHINE

Cloth	Size of Needle	Number of Thread		
		Cotton	Silk	Linen
Fine linen and silk	No. 2	100-200	000-00	.....
Muslins and shirtings	No. 3	70-109	00-0	.....
Dressmaking and general work	No. 4	50-70	A-B	.....
Heavy wool and cotton cloth	No. 5	30-50	B, C, D	.....
Extra heavy cloth	No. 6	Coarse	.....	.....

WHITE SEWING MACHINE

Class of Work	Size of Needle	Number of Thread		
		Cotton	Silk	Linen
Very finest work on any materials	No. 00	150-300	000	.....
Lingerie, fine shirtwaists, dresses, etc.	No. 00	90-150	00	.....
Ordinary household garments	No. 0	70-90	0	.....
Household supplies, heavy garments	No. 1	50-70	A-B	.....
Heavy domestic work	No. 2	30 50	C	.....
Heavy domestic work	No. 3	20-30	D	.....
Heavy domestic work	No. 4	8-20	E-F	.....

It must be remembered that in machine-sewing, finer thread is used than in hand-sewing, the reason being that two threads are used on the machine to one in hand work, and that the stitches in machine work are much finer than in hand work.

THE DOMESTIC MACHINE

Cloth	Size of Needle	Number of Thread		
		Cotton	Silk	Linen
Very thin muslins, cambrics, linens, etc.	No. 0	100-150	000-00	.....
Very fine calicoes, linens, shirtings, fine silk goods, etc.	No. B	80-100	.....	.....
Shirtings, sheetings, bleached calicoes, muslins, silk, general domestic goods and all classes of general work	No. ½	60-80	A-B	.....
All kinds of calicoes, light woolen goods, heavy silk, seaming, stitching, etc.	No. 1	40-60	C	.....
Tickings, woolen goods, trousers, boys' clothing, corsets, cloaks, mantles, etc.	No. 2	30-40	D	.....
Heavy woolens, tickings, bags, heavy coats, trousers, etc. Heavy clothing generally	No. 3	24-30	E	60-80

THE ELDREDGE MACHINE

Class of Work	Size of Needle	Number of Thread		
		Cotton	Silk	Linen
For the very finest	No. 1	300-500	0000	.....
For the finest work that ordinarily occurs	No. 2	120-200	000	.....
For fine lingerie	No. 3	90-110	0-00	.....
For common underclothing, calico, etc.	No. 4	70-80	A&O	.....
For unbleached cotton or linen fabrics	No. 5	40-60	A-B	.....
For heavy work	No. 6	12-36	B-C	.....
For very heavy work	No. 7	0-10	C&D	.....
For the coarsest soft goods	No. 8	.....	.....	.....

Standard Machine

Class of Work	Size of Needle	Number of Thread		
		Cotton	Silk	Linen
Embroideries, lawns, etc.	No. 1	200-250	000	.....
Fine linen underwear	No. 2	120-150	00-0	.....
Muslin or linen	No. 3	90-110	0-A	.....
Dressmaking	No. 4	60-80	0-A	.....
Woolen cloths and flannels	No. 5	40-50	B	.....
Heavy woolen clothing	No. 6	20-36	C&D	.....

A needle plate (throat) with extra large needle hole can be procured when the machine is used for heavy work.

Singer Sewing Machine

Cloth	Size of Needle	Number of Thread		
		Cotton	Silk	Linen
Very thin muslins, cambrics, linens, etc.	No. 9	100-150	00&000	.....
Very fine calicoes, linens, shirtings, fine silk goods, etc.	No. 11	80-100	0	.....
Shirtings, sheetings, calicoes, muslins, silk and general domestic goods and all classes of general work	No. 14	60-80	A&B	.....
All kinds of heavy calicoes, light woolen goods, heavy silk, seaming, stitching, etc.	No. 16	40-60	C	.....
Tickings, woolen goods, trousers, boys' clothing, corsets, cloaks, mantles, etc.	No. 18	30-40	D	.....
Heavy woolens, tickings, bags, heavy coats, trousers, etc. Heavy clothing generally	No. 19	24-30	E	60-80
Bags, coarse cloths and heavy goods	No. 21	Coarse	.....	40-60

FREE SEWING MACHINE*

Class of Work	Size of Needle	Number of Thread		
		Cotton	Silk	Linen
Very thin muslins, cambrics, etc.	No. 0	100-150	000-00	.....
Very fine calicoes, linens, shirtings, etc.	No. B	80-100	0	.....
Shirtings, sheetings, muslins, general domestic work	No. ½	60-80	A-B	.....
Heavy cottons, light woolens, heavy domestic work	No. 1	40-60	C	.....
Tickings, woolen goods, trousers	No. 2	30-40	D	.....
Heavy woolens, bags, heavy coats, etc.	No. 3	24-30	E	.....

*The needle on this machine is not measured the entire length, but from the top of the eye to the extreme top of the shank.

NEW HOME MACHINE (VIBRATING)*

Class of Work	Size of Needle	Number of Thread		
		Cotton	Silk	Linen
Very fine thin muslins, chiffons	No. 0	120-300	.....	.....
Very thin calicoes, fine silk, linen	No. B	90-120	000-00	000-00
Shirtings, muslins, general domestic work	No. ½	60-90	0-00	.....
All kinds of heavy cottons, lightweight woolens	No. 1	40-60	A-C	.....
Tickings, trousers, cloaks, suits	No. 2	24-40	A-C	.....
Heavy woolens, heavy coats	No. 3	10-24	A-B	60-80
Coarse cloths, heavy goods of any texture	No. 4	1-10	B, C, D	40-60

*On this machine, two throat plates are used. For needles O-B, 1-2 and 1, use throat plate with a small hole; for 2, 3 and 4, use throat plate with a large hole.

24. Breaking of the Upper Thread.—The breaking of the upper thread may be caused by the following: (1) the machine being incorrectly threaded; (2) an imperfect needle; (3) a crooked needle; (4) upper tension may be too tight;

(5) the needle eye too small for the thread; (6) needle rubbing against attachment presser foot or throat plate; or (7) the needle may not be set properly.

25. Breaking of the Under Thread.—The breaking of the under thread may be caused by the following: (1) the shuttle being incorrectly threaded; (2) shuttle tension too tight; (3) bobbin wound too full so that it will not revolve freely; (4) loose or uneven winding of bobbin; (5) the hole in the throat plate (which may become rough, caused by the needle striking the plate); (6) an accumulation of dust or dirt in the shuttle cavity, which will prevent the shuttle from turning freely.

FIG. 68. Lift the latch *G* to remove the shuttle race on the White rotary.

26. Broken Needles.—Broken needles are commonly caused (1) by the lack of care in releasing the tension before withdrawing the work from under the presser foot. In withdrawing work, always stop with the take-up bar at its highest point, raise presser foot, which will release the tension, and draw the work to the back. Another cause of broken needles is (2) the operator trying to aid the feed and pulling the material as the machine is stitching. *This must not be done.* Still

another cause may be that (3) the presser-foot attachment has not been pushed clear back on the bar and securely clamped.

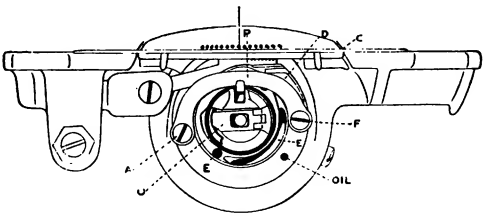


FIG. 69. Remove the screws *A* and *F* to release the shuttle race on the Standard rotary.

FIG. 70. Hook-guard on the Eldredge removed and the parts in position ready to reassemble.

(4) Coarse thread in a fine needle will also cause broken needles. Care must always be exercised when stitching over intersecting seams or over several thicknesses of material.

27. Directions for Cleaning and Oiling a Machine.—The necessary equipment for caring for the machine consists of a *clean* piece of cheese cloth, a large and a small screwdriver, a stiletto, and a small, flat brush. The stiletto and screwdriver are a part of the sewing-machine equipment, and the last-named article can be purchased for ten cents at any hardware or five-and-ten-cent store.

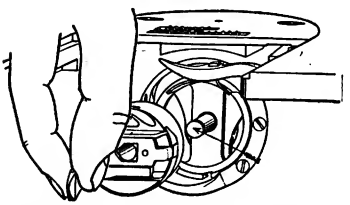


FIG. 71. Position of the shuttle cap release screws on the rotary Singer.

FIG. 72. Position, in general, of the oil cups on the upper part of the head of all vibrating machines.

Remove thread, bobbin and bobbin case, needle and presser foot; unscrew the throat plate (found directly under the presser foot), and remove it and the shuttle slides or covers. On the 66-1 Singer machine, a screw which holds the shuttle race is just to the right of the bobbin ejector. On the

FIG. 73. Position of the oil cups, in general, on the upper part of the head of all rotary machines.

White rotating machines, a small bar (*G*, Fig. 68) at the side front can be lifted to remove the shuttle race. On other oscillating and rotating machines, small screws (*A* and *F*, Fig. 69, Figs. 70, 71) release the shuttle race. It is not always necessary to remove the shuttle race, but experience shows it a wise

thing to do—at least three or four times a year—as the constant use causes an amazing amount of dust to collect. With the cloth, wipe each part; then with the brush and pick, remove all dust and lint around the feed. Be especially careful

FIG. 74. Position of oil cups on the bobbin winder of the vibrating machines.

to remove any ends or knots of thread which may come in view. The face plate may be removed and all dust carefully brushed out (once a year is all that is necessary). This plate is removed by screws (Figs. 31 and 117b) on the back or the front, according to the make.

Unbelt the balance wheel, turn back the head and brush and wipe clean all exposed parts. With a whisk broom and an oiled duster, remove all dust, dirt and pins from the wooden

pan directly under the head, from the bed, and all parts under the head, and from the drawers.

If the machine has been running hard, it is probably due to gummed oil. This should be removed before fresh oil is used. Apply kerosene (or gasoline, if care is exercised) to all bearings, and run the machine rapidly for a few minutes. This will dissolve the gum. Wipe all parts carefully, then run the machine again, and wipe. *Continue running and wiping until there is no excess of kerosene*; then oil all bearings,

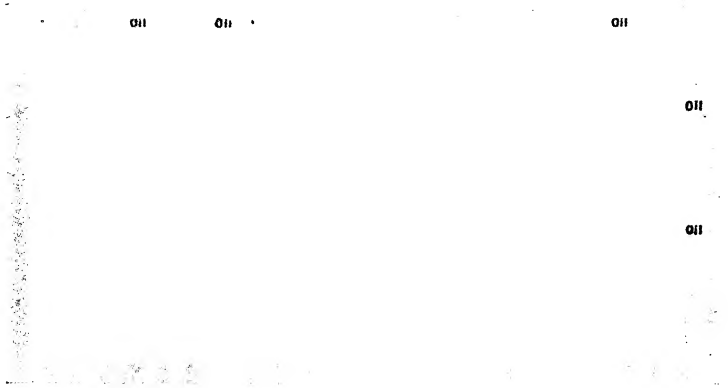


FIG. 75. Position of the oil cups on the under side of vibrating machines.

being careful not to miss any, as the kerosene will evaporate, and the bearing be left dry. It is impossible to give specific directions for oiling, as the oil cups are not placed in the same position on all machines. In general, these are the important points: Balance wheel (Fig. 72), presser bar (Fig. 73), needle bar (Fig. 73), take-up cam (Figs. 72, 73), shuttle race (Fig. 73), stitch regulator (Fig. 73), bobbin winder (Fig. 74),

and main shaft drive near the spool pin (Fig. 72). A plate may be removed on most machines for this purpose. The main shaft in the arm is oiled thru oil holes in the arm which are easily located. Unbelt and turn back the head, and oil the shaft (Fig. 75), shuttle lever (if the machine is the vibrating type), feed bar (Figs. 75, 76), feed lever, feed adjusting screw, *and all places where friction is found* (also Figs. 14, 15, 16). The places on the stand requiring oil (Fig. 76a) are

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FIG. 76. Position of oil cups on the under side of rotary machines.

the journal of the drive wheel, the bearings at each end of the pitman, and the bearings on each side of the treadle. Only the best sperm oil should be used, and if the machine is in constant use, one drop in each bearing should be applied daily.

Wipe all parts to remove excess oil, then thread, and stitch on a waste piece of cloth to be sure that every part is properly adjusted before stitching is begun. School machines should be cleaned at least every two weeks, and oiled at least once a week. The students should be taught to do this work, allowing the classes to take turns in keeping everything perfectly clean.

28. Operating the Machine.—The beginner should learn the parts of the machine and the purpose of each one as she uses it. She should begin with treadle practice, and for this exercise, the machine must be unbelted, the thread removed from the top, and the shuttle taken out. Use a chair high enough to allow the feet to be placed comfortably on the

FIG. 76a. Position of the oil cups on the stand of all machines.

treadle, and sit squarely in front of the machine (See page 8). The feet should be placed with the ball of the left foot upon the upper left corner of the treadle, and the right foot placed back upon the lower right corner. This position allows the operator to use a motion which is similar to the

natural one of walking, using first one foot and then the other. Treadling with the feet in this position takes very much less force than when placed side by side, since the weight necessary to move the treadle decreases in proportion as it is removed from the pivoting rod on which the treadle swings. Simple exercise in treadling and in stitching on paper will enable the beginner to gain control of the machine with ease and speed.

As soon as the operator can treadle easily, belt the machine, and with the machine unthreaded and the bobbin out, practice starting and stopping with the hand on the balance wheel. The balance wheel may turn to the back or to the front, according to the make and type. In general, vibrating machines turn to the front; oscillating machines turn to the front, and rotary machines, with the exception of the Eldredge rotary, Domestic rotary, and Davis rotary, turn to the back. If the operator is in doubt, turn the balance wheel with the hand and see if the feed carries to the back, following the upward motion of the needle, or place a piece of cloth or paper under the presser foot and test by stitching. The wheel must turn in the direction which will enable the feed to carry the material away from the needle with each succeeding stitch.

The method of starting and stopping is the same on all machines. Place the right hand on the top of the balance wheel and turn until the feet feel the motion in the treadle; start treadling, running first swiftly, then slowly, but keeping the thought of smoothness and ease always in mind.

Always stop the machine with the hand on the balance wheel, turning the wheel slowly until the take-up bar is at its highest point. This is necessary, as the work cannot be withdrawn

until the loop formed by the upper thread has been released from the hook which carries it around the shuttle. As the take-up draws up the slack thread and tightens the stitch in the material, it can be used as an indicator of the position of the thread. On rotary machines, if the take-up bar is not in position, the thread is left too short and the needle becomes unthreaded; therefore, it is much more satisfactory to practice this method at the beginning. If the balance wheel reverses its motion, due to uneven treadling, *stop the machine at once* and try over again. The operator should continue this practice until a smooth, even motion is obtained and the start and stop made without difficulty. Practice for periods of five or ten minutes with a short rest between practice periods, and a half hour or less of practice will be all that is necessary.

29. Practice Work for a Beginner (*A* and *B*, Fig. 77).—The next step is an important one to the beginner if straight stitching is to be accomplished with minimum effort. Provide pieces of smooth, brown paper about three inches wide and twelve to fifteen inches long. With a pencil and ruler, draw lengthwise lines one-fourth of an inch apart (*A*, Fig. 77), and let this represent basting. Place the needle in the paper one-sixteenth of an inch to one side of the line; lower the presser foot, and stitch. This represents stitching along a line of basting. Practice this until perfect results are obtained.

The next practice work is on a piece of paper the same size as before. Place the right-hand edge of the presser foot even with the right-hand edge of the paper, and stitch; continue by placing the presser foot even with the row of stitching just

made, and so on (*B*, Fig. 77), until the piece is filled. This exercise prepares for the use of the presser foot as a guide in stitching.

A third practice piece is made in the following manner:

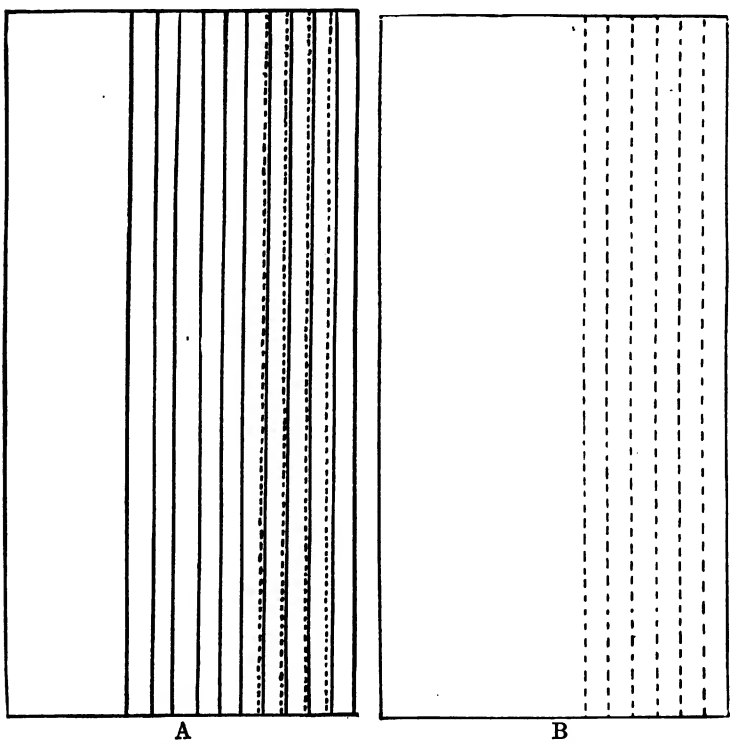


FIG. 77. Method of stitching on paper for machine practice.

Use a twelve-inch square of paper, and draw a nest of squares, beginning with a ten-inch square, and making each succeeding square one inch smaller, until a one-inch square is obtained. Begin stitching a half inch or more from a corner,

and stitch exactly upon the pencil lines. To turn a corner, stop with the needle in the paper, and exactly on the corner; raise the presser foot and turn to the correct position; then lower the presser foot and proceed.

These three pieces of practice work give accuracy, speed, knowledge and control of the machine with a minimum amount of time and expense.

The next step is threading and stitching. Directions for threading are given in the first part of this chapter. The beginner can usually save time here by making use of pieces saved from cutting, and learning the French seam, flat fell, or any other seams needed for immediate use.

CHAPTER V

General Directions for Stitching

30. Position of the Work.—Always keep the material to the left of the presser foot, allowing the seam to extend to the right. This prevents wrinkles and any dust or machine oil from soiling the work. The usual presser foot will serve as a guide whenever a fourth-of-an-inch seam is required.

To stitch a bias and a straight piece of cloth together, stitch with the bias side down on the feed. This allows the feed to take care of any tendency on the part of the bias to "crawl," and allows the operator to guide upon the lengthwise, or warp, thread of the cloth. This is also a decided saving upon the eyesight. Always place the fullness or gathers on the feed for stitching, as the teeth of the feed will aid in keeping an even distribution of the fullness. Loosen the tension before stitching velvet.

Stitch bias seams *with* the bias instead of *against* it. Thus, a skirt having bias seams should always be stitched from the bottom to the top. This helps to prevent stretching.

A hem should always be stitched as near the edge as possible (*a*) to prevent the first turn in the hem from raveling out, (*b*) to prevent dust from collecting in the edge of the hem, and, above all (*c*), to obtain straight stitching.

On machines where the presser foot lever does not act as a tension releaser, be sure to release the thread before attempting to withdraw the work from under the presser foot. Also be careful that the machine does not turn while work is being removed, as this will cause the needle to strike on the throat plate.

Always guide the work as lightly as possible, using only the tips of the fingers. Never try to aid the feed by pulling; if the work does not move as fast as it should, lift the presser foot lightly for the few stitches necessary over heavy seams or folds, or release the pressure by turning the screw controlling the presser-foot spring.

31. Attachments.—Every machine is furnished with certain attachments to facilitate the work of garment-making and ornamentation. The attachments are the hemmers for various widths of hems, tucker, binder, ruffler, braider, edge stitcher, and quilter. The operator should not attempt the use of the attachments until every detail of plain stitching has been mastered; then she should begin with the simplest attachment and master that before proceeding with the next. Pieces of muslin from the scrap bag which have been ironed free from wrinkles, or paper cambric, may be used for practice work. Save all the pieces left when cutting such garments as drawers, chemises, night-gowns, aprons, etc., and ample material will be provided for practice work.

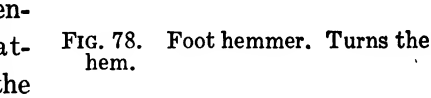


FIG. 78. Foot hemmer. Turns the narrowest hem.

32. Foot Hemmer and Feller.—The foot hemmer (Fig. 78) stitches a one-eighth-inch hem, and can be used for other purposes as well.

Remove the presser foot and raise the needle bar to its highest point. Insert the hemmer in the presser foot groove and press as far back as possible, turn the balance wheel slowly to see if the needle enters the opening properly; then tighten the presser foot screw until the hemmer is held firmly. The upper and under threads should *both* be drawn under and to the back of the hemmer.

Prepare and insert the material in the following manner: Clip the corner and crease a fold one inch wide and one-eight of an inch or more along the edge to be stitched. Insert this folded edge in the scroll of the hemmer and push it forward gently to the needle. Turn the balance wheel until the needle enters the fold of material; then lower the hemmer foot for stitching. The goods must now be held with the edge rolled up (Fig. 78) as it passes into the hemmer. This is best done by holding the edge between the thumb and forefinger of the right hand and keeping the forefinger of the left hand in the roll and just in front of the hemmer. Stitch slowly at first, and if the material slips from the hemmer, leaving a single fold instead of a hem, move the hand to the left and allow more of a curve to roll between the thumb and finger. If too much cloth turns into the hem, lessen the amount of roll between the thumb and finger by moving slightly to the right.

The left forefinger held in the position indicated assists in keeping the material smooth and in shaping the roll as it enters the hemmer.

When hemming an *outside* curve, hold both hands near the hemmer, allowing only a few inches to roll at a time. Place the tips of the fingers of the left hand upon the material and

draw gently to the *left*. This prevents an excess of material from forming a tuck under the hemmer foot.

When hemming an *inside* curve, hold the right hand at least three inches from the hemmer, and with the tips of the fingers of the left hand, gently push the material into the *scroll of the hemmer*.

FIG. 79. Foot hemmer used to hem and sew on lace in one operation.

To hem a bias edge, especially on soft or elastic goods, hold the roll gently to prevent stretching, and retard the feed slightly by placing the tips of the fingers of the left hand upon the material just in front of the hemmer.

This attachment is used to fell the wide half of a flat fell seam. When used for this purpose, the first seam is stitched in the usual manner, then trimmed and pressed. The wide edge of the seam is placed in the scroll in the usual manner and stitched flat.

The French fell seam may be made with the hemmer. Baste the edges together with the outside edge about one-sixteenth of an inch beyond the other. Place in the hemmer, and proceed in the usual manner. Seams cut lengthwise or

crosswise of the material may, with practice, be stitched without basting. Seams cut on the bias must be basted and handled with care to be satisfactorily stitched in this way.

33. Hemming and Sewing on Lace in One Operation.—The material is inserted in the hemmer in the usual

FIG. 80. Wide hemmer from set of graded hemmers.

manner; then the lace is drawn into a slot situated on the right-hand side of the hemmer and under the needle (Fig. 79). The material is then guided with the left hand alone, while the right hand guides the lace. The lace must be stitched with the right side down and held gently, so that it will not be stretched.

Care must be taken to keep the lace well in the slot so that the needle will catch it every time it passes into the goods. It is obvious that lace cannot be stitched to an outside curve in this manner, as the hemmer does not provide for the necessary fullness.

The wide hemmers (Fig. 80) are operated in the same manner as the foot hemmers, except that the cloth in the beginning is carried entirely through the hemmer and beyond the

needle and drawn back and forth until the hem is well formed. The roll varies with the width of the hemmer, but the left hand and forefinger must be used to help keep the goods smooth and well to the right of the hemmer.

An adjustable hemmer (Figs. 81, 82) is used on the Singer machines instead of several hemmers of varying widths. It is operated like any other hemmer.

FIG. 81. Adjustable hemmer used on the Singer machines.

FIG. 82. Adjustable hemmer used on very wide hems. Remove screw and outside scroll.

34. The Tucker.—To adjust the tucker remove the presser foot, raise the needle bar, and push the tucker as far back on the presser foot bar as it will go. Adjust the creaser bar lever under the needle clamp screw. Turn

the balance wheel slowly, and, when the needle passes thru the needle hole in the foot without interfering, turn the screw or presser-foot clamp until the tucker is firmly secured. Draw the upper and under threads under the tucker and to the back.

There are two parts to the tucker—a gage to control the width of the tuck, and a creaser bar which measures the distance between tucks and marks the fold for the next tuck. These two parts may be controlled by one screw (*3*, Fig. 83), or each part may have a screw of its own (Fig. 84), according to the make of the tucker.

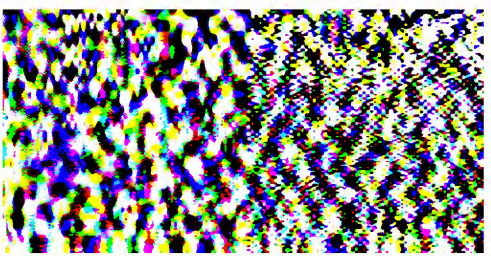


FIG. 83. One-screw adjustment tucker used on all machines except Singers.

There are two methods of regulating the tucker—first, by using the scales stamped upon the tucker frame (Fig. 84), and, second, by using a pencil and paper. If the scales are used, adjust the two gages so that the scale indicators point to the same number on each scale, and the tucks will just meet. If a space between tucks is desired, that amount must be added to the numbers *upon the scale which controls the creaser bar.*

If the second method is used, proceed as follows: Decide upon the width of tuck and the space between tucks. Measure in from the straight edge of a piece of paper the desired width of tuck, and draw a short line. From this line measure in again the desired space between tucks *plus* double the width of the tuck. Example: one-fourth-inch tuck and

three-eighths-inch space. The first line is drawn one-fourth of an inch from the edge of the paper; the second line, seven-eighths of an inch from the first line (three-eights-inch space plus double width of one-fourth-inch tuck). To set the tucker, loosen the screws, and, placing the paper in the tucker

FIG. 84. Two-screw adjustment tucker used on all Singer machines.

in the usual manner, turn the balance wheel until the needle descends thru the first line on the paper. Adjust the tuck gage until it rests even with the edge of the paper, thus establishing the width of the tuck; then move the creaser bar until it rests upon the second line, thereby indicating the crease for the succeeding tuck, and tighten the screw.

Whether the first or second method is used, always test upon a piece of cloth before stitching is begun. The second method may seem at first to be more complicated, but the scales are often found to be untrue, and if the second method is used, the tucker can always be set with absolute accuracy.

To commence tucking, the first tuck must always be measured and folded by hand. Insert the cloth between the creaser bar and blade and under the blade spring (*6*, Fig. 83). Draw to the right until the fold is against the tuck gage and *under the*

presser foot. Lower the presser foot, and, keeping the folded edge against the tuck gage, sew as in plain work. After each tuck has been completed, *open* the material and *crease the tuck flat* before folding for the next tuck. This must be done to prevent creases forming and to keep the work smooth and

FIG. 85. Method of binding.

even for each succeeding tuck. Always stitch with the finished tucks on the under side in order that the right side of the stitching may be on the upper side of the tucks.

When making the last tuck, the lever which controls the creaser bar may be withdrawn from under the needle clamp screw, thus preventing a useless crease.

35. The Binder.—This attachment (Fig. 85) is useful in binding seams of suits, skirts, coats, the edges of aprons, etc. Either bias binding or common dress braid may be used. The bias binding may be bought already folded or cut seven-eighths of an inch wide. Dress braids being narrow and having a finished edge, the edges are not turned under as in the case of bias binding.

To adjust the binder, raise the needle bar to its highest point, remove the presser foot, and push the binder as far back as it will go on the presser-foot bar; turn the balance wheel slowly until the needle is in the needle hole, and tighten

the clamp screw securely. Draw the upper thread thru the needle hole on the binder and place it with the under thread to the back of the binder.

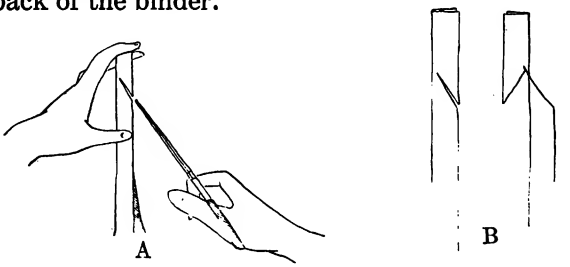


FIG. 86. Preparation of the binding for insertion in the binder.

To insert the bias binding in the binder, fold the bias in the center and crease about two inches. An inch or more down from the end, cut on an upward slant from the outside edge to

FIG. 87. Method of inserting the binding in the binder.

within one-eighth of an inch from the fold (*A* and *B*, Fig. 86). Open the binding, and, holding the cut end in the left hand and the binding in the right hand, slip into the front of the binder

and draw to the back (Fig. 87). Folded binding and braid are used in a slot cut in the back of the binder scroll. The cut end serves as a guide in drawing the binding in smoothly and prevents troublesome creases. Insert the edge of the material between the folded edges (Fig. 85) of the binding, and stitch. The binding is held with the right hand and the material guided with the left hand.

FIG. 88. Gage used to cut binding.

Folded binding, plain binding and braid may all be used in the binder. Two widths of the folded binding No. 7 and No. 6 can be used. No. 7 is inserted in the inside of the scroll, but the edge does not fold or turn a second time, since it is already prepared. No. 6 and braid are used thru the slot cut in the scroll. Plain unfolded

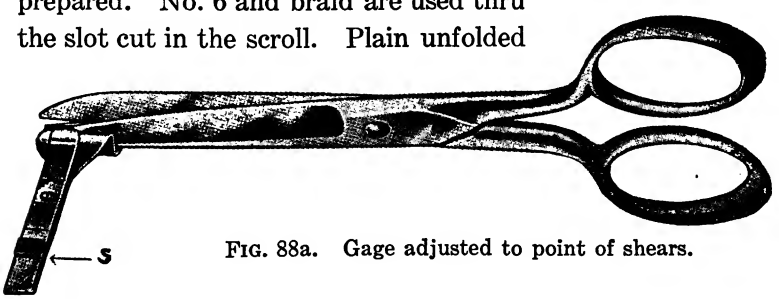


FIG. 88a. Gage adjusted to point of shears.

binding is used thru the scroll in the usual manner. This binding can be purchased from the maker of the attachments, the name and address being stamped on each attachment.

A gage (Fig. 88) to be used on the points of the scissors is found useful in cutting binding, facing or cording. This gage is found in the attachment box of all machines, and needs no further directions for its use than the illustration in Figs. 88, 88a, and 88b.

To bind scallops, hold the goods a little firmer than the binding to prevent its being drawn. When the point between the scallops is reached, swing back the material to the left so that a straight line is formed, and continue to stitch until the scallop is well started; then follow the curve of the scallop.

To bind corners, stitch to one-eighth of an inch from the corner; then, with the needle down in the work, raise the

FIG. 88b. Method of using the bias gage.

presser foot and turn the material. Be careful that the edge is carried well into the binder. Raise the needle and draw the material to the front about one-eighth inch, *but do not draw binding.* This will form a tiny fold upon the corner and allow extra binding to prevent curling. If the fold made is not sufficient to form a flat corner, repeat and draw more material *away* from the binder before drawing to the front. This will give a little extra material for the corner. A little practice will give instant judgment regarding the amount to allow for corners.

French folds are made by inserting the binding into the binder in the usual way and stitching the edges together. These may be stitched to the garment at the same time by placing the material *under* the binder, or they may be stitched

upon the garment by hand. When the fold is stitched upon the material, the material must be held firmer than the binding in order to make it lie flat when finished.

36. Ruffler.—To attach the ruffler (Fig. 89), remove the presser foot and raise the needle bar to its highest point. Place the fork of the ruffler (*B*, Fig. 89) over the needle clamp shoulder, and push the attachment on the presser-foot bar as far as it will go. Turn the balance wheel until the needle descends thru the needle hole in the ruffler; then clamp securely. Carry the upper thread down thru the needle hole and draw both upper and under threads to the back.

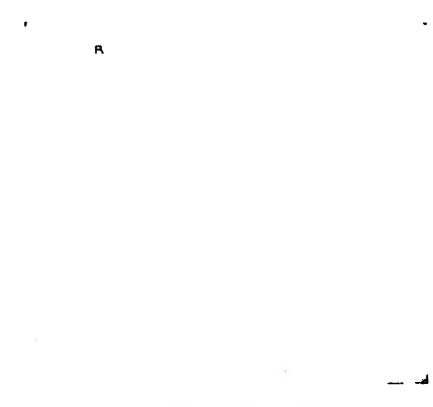


FIG. 89. The ruffler.

Insert the material to be ruffled between the blue blades and into the guide to keep the gathering an equal distance from the edge; then stitch as in plain sewing.

The amount of fullness is regulated by a screw (*C*, Fig. 89), or on some rufflers a lever placed either on the top of the ruffler or to the right side. To lengthen the stroke of the blade, thus producing more fullness, turn the screw to the right; to lessen the fullness, turn to the left. If the ruffler has a lever instead of a screw, raise the lever to produce fullness, and lower to lessen fullness.

The stitch must be lengthened or shortened as the stroke is lengthen or shortened. To make fine scant gathers, use a

short stitch and turn the regulating screw to the left until the least possible amount of material is taken up by the blade.

To stitch a ruffle on as it is being made, place the material below both blades, under the presser foot (Fig. 89), and into the second set of guides on the ruffler (Fig. 89); then insert

FIG. 90. Gathering the ruffle and sewing it to the garment with the facing in one operation.

the ruffle between the blue blades (Fig. 89) in the usual way and stitch.

A facing may be stitched at the same time by placing it over the ruffle and into a slot (Fig. 90) which acts as a gage on top of the blades. This makes three pieces of goods to be held in position.

Carry the bias binding between the third and fourth fingers, and the ruffling between thumb and the first finger of the left hand. The right hand assists in keeping all material smooth, starts and stops the machine, and controls the under material.

To turn a corner, due allowance must be made for the extra fullness required. Stitch to within one inch of the corner; then turn the regulating disc to the right, adding a little more fullness; when within a half inch, turn the regulating disc again, adding still more fullness. Stitch to the corner, and with the needle in work, raise the presser foot and turn the *under* material, and draw it carefully into position (a small stiletto will assist in this); then lower the presser foot, and when one-half inch has been stitched, turn the regulating disc to the left and remove half of the fullness added for the corner. Stitch a half inch and turn the regulating disc to its first position. The newest rufflers have a scale which makes the regulating of fullness a matter of mathematics, but on the older types, the operator must practice turning the disc until sufficient skill and judgment have been attained to make the adjustment quickly.

FIG. 91. Shirring with the ruffler.

A ruffle may be made with a heading by creasing a fold the desired width and placing it between the blades. Carry it under the second guide and over the first.

The ruffle with a heading may be stitched on the edge of the garment, or may be stitched with the bottom of the ruffle even with the bottom of the garment. To do this, remove the

ruffler from the machine, and remove the lower blade of the ruffler by turning the small screw at the right of the ruffler and just under the fork. Screw the separator to the shuttle slide provided for that purpose; remove the ordinary slide, and insert the new slide and separator. Then attach the ruffler as usual.

The edge of the garment must first be finished by hemming or by any other desired method.

With the right side up, insert the edge of the garment from the *left* under the ruffler, allowing it to come to the right of the needle a distance equal to the width of the guide. With the right side up, insert the ruffle from the *right*, drawing it between the blades and to the left of the needle a distance equal to the width of the cloth guide. Proceed as in plain ruffling.

FIG. 92. Plaiting.

When the ruffle is to be placed with the lower edge even with the edge of the garment, place the garment under the ruffler from the *right* and to the left of the needle a distance equal to the width of the ruffle. Insert the ruffle from the *left* and to the right of the needle a distance equal to the width of the guide. Keep the garment straight and smooth, and with the two edges even, stitch as usual.

With the separator blade in position (Fig. 91), shirrings may be made any desired width apart. There is no guide for

these shirrings, but a guide may be basted, or the quilter may be used, employing it as for ordinary quilting.

The separator is also called the shirring blade, shirring slide and shirring plate.

Piping may be stitched on when the ruffle is being made by folding the bias piping and inserting it between the material and the ruffle, using the second guide for the purpose.

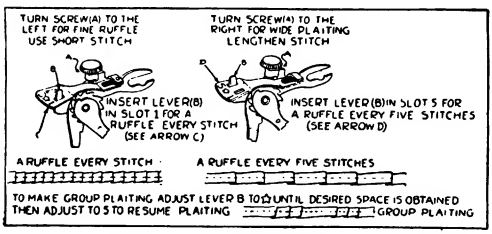


FIG. 93. Method of adjusting the ruffler for plaiting.

Heavy plaiting may be made by folding the material and inserting it in the usual manner. Turn the regulating screw to make a long stroke; then lengthen the stitch to correspond (Figs. 92, 93).

Never try to use both separator and under blade at the same time, nor to ruffle without one of them.

Never run the machine without material between the blades, because the movement of the teeth of the upper blade on the lower will dull and ruin the blades.

Oil the working parts of the ruffler before using.

Always remove the separator and replace the under blade before the ruffler is put away.

37. Quilter.—The quilter (Fig. 94) is used for the purpose of quilting or in any place where parallel lines of stitching are required.

The adjustment of the quilter varies on different makes of machines. It may be inserted in a small hole in the lower end

of the presser bar and secured by a small screw, or it may be made with a flange which is inserted above the presser foot and secured by the presser-foot clamp or screw.

The curved part, or quilter arm, serves as a guide between stitchings, the distance between needle and quilter arm being regulated by loosening the adjusting screw and moving the quilter the desired distance to the right or left, and tightening. If the material to be quilted is heavy or contains several thicknesses, the amount of pressure on the presser foot should be lessened by turning the screw at the top of the presser-foot bar to the left.

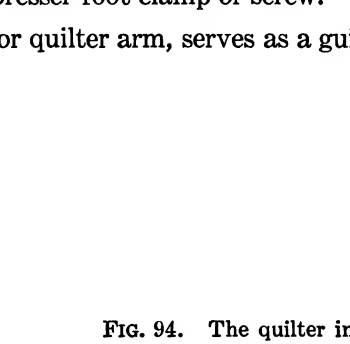


FIG. 94. The quilter in use.

38. Braider.—Braiding may be done from the upper right side of the material or from the under side, or wrong, according to the machine used. If braiding is done from the right side, a braider foot is used. This is much like the usual presser foot except that the prongs are of equal size and the space between is divided by a crosswise bar.

The braid is carried over the bar between the presser-foot prongs, under the needle, and down under the presser foot. The material is stamped upon the right side, and the braid is stitched upon the tracings. No guiding of the braid is necessary except to keep it free from kinks and right side up. This is an old method, but is described, since there are many machines still using this type of braider.

When under-braiding is done (Fig. 95), raise needle bar to

its highest point, remove presser foot and adjust the braider foot. Remove the front shuttle race slide and insert the braiding slide. This slide contains a groove into which the braid is drawn, the right side *down*. The material must be stamped upon the wrong side and is placed with the *right* side

FIG. 95. Under-braiding.

down. Stitch directly over the outline stamped upon the wrong side.

Use a rather long stitch and a fairly loose tension. Turn corners when needle is at its lowest point to keep the stitches from "cutting corners."

39. Special Attachments.—Many sewing machines include some attachment "special" to that make of machine, and other special attachments may be purchased either from the sewing-machine dealers or from the manufacturing company.

A hemstitching attachment (Fig. 96) for any make of machine may be purchased from the dealer or Greist Mfg. Co., New Haven, Connecticut, manufacturer of sewing-machine attachments. Directions for its use are as follows:

Remove the front shuttle slide and secure hemstitcher in its place. Be sure the needle works in the center of the needle hole. Place the first piece of cloth under the rear block; then

FIG. 96. The foot hemstitcher in use.

the slots, and over the front block; the second piece of cloth is placed under both blocks. Lower presser foot and stitch, being careful to guide the edges of the material in a straight

FIG. 97. The foot gatherer used on the White machines.

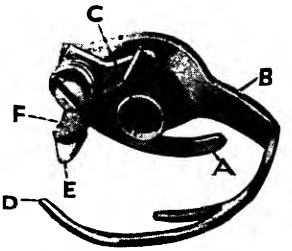


FIG. 98. The spider attachment used to replace the bobbin on the Standard machine to change from lock-stitch to chain-stitch.

line. The tension and length of stitch are regulated to suit the quality of the cloth.

The foot gatherer (Fig. 97) is used on the White machines, and no special directions are necessary for its use. It replaces

the presser foot and the fullness is regulated by the length of stitch and the tension.

The spider, a chain-stitch attachment (Figs. 98, 99), used on the Standard rotary machines, is useful where altering is desired. To change from a lock-stitch to a chain-stitch:

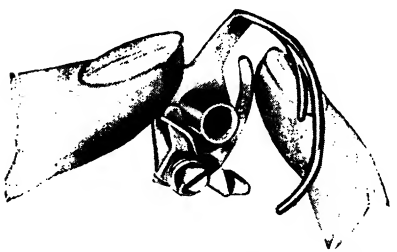


FIG. 99. Method of holding the spider to insert in shuttle race.

1) Open shuttle cover and remove bobbin and case. Turn the shuttle by moving the balance wheel forward, so that the center of the needle slot (*I*, Fig. 100) is facing downward.

2) Take attachment in the left hand as in Fig. 99; press

FIG. 100. Shuttle race in which the spider is inserted.

FIG. 101. Spider in correct position in the shuttle race.

the thumb and fingers together; then slip the hollow post (*C*, Fig. 98) over the spindle (*J*, Fig. 100) in the shuttle, taking care that the prong (*D*, Fig. 98) passes in front of the shuttle point (*H*, Fig. 100).

3) Remove regular needle plate and use the special slotted needle plate provided for this purpose.

4) Thread the machine and stitch, being careful to hold the end of the thread until several stitches have been taken. Unless the end of the thread is held securely, it is drawn into the shuttle race and a knot is formed.

5) Should the thread break, make the tension stronger, either by tightening or wrapping the thread around the needle. Be careful not to try to force the attachment into place; it will slip in easily when in the correct position. Do not run the machine in the wrong direction after threading, and be careful not to sew without goods under the presser foot.

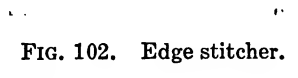


FIG. 102. Edge stitcher.

The Singer Company manufactures several special attachments such as the buttonhole attachment, hemstitch presser foot, a single and a double thread embroiderer, and a cording attachment. Directions for these special attachments are obtained with each one of them.

The edge stitcher (Figs. 102, 103) is used in joining finished or unfinished edges, tho when used for the latter purpose, is not an entirely satisfactory joining where neat work is required. The material is inserted in the numbered slots according to the type of work being handled, Figs. 102 and 103 giving sufficient instructions.

40. Machine-Darning.—Machine-darning (Fig. 104) is much advocated by the machine demonstrators. It is accomplished by lifting the presser foot and tying a piece of tape under the presser-foot lever and around the top of the presser-foot bar, thus holding the presser foot high enough to enable

the cloth to be moved easily under the presser foot. Place the material in an embroidery hoop, or a special attachment

FIG. 103. Method of inserting the material in the edge stitcher.

may be used similar to the embroidery hoop. Now, running the machine rapidly, carry the hoop back and forth slowly. When a sufficient number of rows of stitching have been laid in lengthwise, turn and repeat the process crosswise.

Machine-darning on stockings will never be satisfactory to the person who requires high-class work. The reasons are (1) that sewing thread will never take the place of soft darning cotton or a thread drawn from the material; (2) two threads

FIG. 104. Method of tying up the presser-foot for machine-darning.

are used where only one is required, giving added bulk, and (3) the machine-stitched rows are never as even and smooth as hand-made. On a certain class of work such as the thin spots on huck towels, bath towels, coarse table linen, etc., a very fine thread such as Nos. 150 or 200, and very careful work will produce a fair darn. The work should be done, however, before a very large hole appears.

CHAPTER VI

Electrically-Driven Sewing Machines

41. Types of Electric Machines.—There are two classes of electrically-driven sewing machines—(1) stationary, built on a table or in a cabinet, and (2) portable.

Fig. 105. Standard electric rotary.

The power is obtained by the use of an electric motor which may be connected to the machine by two different methods. In the first method, the motor is an integral part of the machine, it cannot be disconnected, and the machine cannot be operated without it (Figs. 105, 106, 107, 108); in the second method, the motor is detachable and the machine can be operated by the treadle if desired (Fig. 109). The motor may be attached to the machine (Fig. 109a), or may be purchased separately, the latter being especially planned for use on machines already in service.

There are two types of detachable motors—the jack-rabbit, which stands on four feet and is placed on the table just to the rear of the balance wheel, and the bracket type (Fig. 110), which is screwed to the upright of the machine. On both types of motor there is a small rubber-covered grooved

pulley which is held firmly against the balance wheel by a strong spring. These motors are equipped with an adjustment which reverses the motion so they can be used on a machine with the balance wheel turning either to the front or to the back (Fig. 110).

FIG. 106. Domestic electric rotary.

The power may be controlled by a knee lever placed in a convenient position for pressure by the right knee, as on the Domestic (Fig. 106), or placed on the left side as on the Singer (Fig. 108), or by a rheostat and foot control (Figs. 105, 109). The knee control is used on most stationary machines, while the rheostat with foot control (Fig. 112) is used on all portable machines and on the jack-rabbit and bracket motors.

FIG. 107. Willcox and Gibbs Electric Automatic.

The mechanisms of the electrically-driven machines are built on the same principles and in the same manner as when run by foot power, and, with one exception, the descriptions and directions already given will apply. The exception is the new Singer No. 101.

FIG. 108. Singer electric rotary.

42. Special Directions for Singer No. 101.—The new electric Singer No. 101 is built on the rotating principle, but the mechanism is placed in a horizontal position similar to the oscillating Singer No. 66-1. Figs. 113, 113a, 113b show the position of the shuttle race and the manner of placing and threading the bobbin into the stationary bobbin case.

This machine has a hinged presser foot to facilitate stitching over seams or thick places (Fig. 114).

Most motors are made to be operated on either a direct or alternating electric current without change or adjustment, but the Singer is adjustable. When sent out, it is usually adjusted for operating on an alternating current, and the round brass adjusting screw is located at *A* (Fig. 115).

FIG. 109. Domestic machine designed for either electric or foot power.

To change the adjustment of the motor to operate on a direct current, remove the round cap *C* (Fig. 115) and take out

FIG. 109a. Showing electric connections on Domestic machine.

FIG. 110. Bracket motor turned under the arm when not in use.

the screw marked *A*, and insert it in the hole marked *D*, and tighten it; then replace the cap.

All machines and motors are provided with a plug that will

FIG. 111. Bracket motor showing reverse lever, thumb-screws and oil cups.

FIG. 112. Rheostat and foot control used on the detachable motors.

fit an electric-light socket. On most stationary machines, there are other plugs that fit into sockets in the table under the head of the machine (Fig. 116). On the portable ma-

FIG. 113. Position of the shuttle race and the correct method of threading the bobbin in the stationary bobbin case.

FIG. 113a. Another illustration showing method of threading.

chines and the detachable motors, the electric-light plug is all that is used.

If the knee lever is used, it must be pulled down until it comes to a stop in a vertical position, as shown in Fig. 108.

The machine is now ready to operate after it has been threaded in the usual manner.

43. Oiling.—Oiling the machine and motor every day if in constant use is extremely important. Oil the parts of the machine as already directed in the discussion of cleaning and oiling.

FIG. 113b. Threading the bobbin.

FIG. 114. New hinged presser foot on the Singer electric.

FIG. 115. To adjust the motor from alternating current to a direct current.

There are three oil cups on the detachable motors, as shown in Fig. 111. Oil the hinges on the rheostat also.

The Singer No. 101 is oiled entirely from the top of the machine (Figs. 117, 117a, 117b), and one drop is used in each cup

each day it is in use. In oil cup *C* (Fig. 117), twelve or more drops are used each time it is oiled. Oil holes are provided in the machine for bearings which cannot be directly reached.

FIG. 116. Connecting the plugs on the 101 Singer.

FIG. 117. Position of the oil cups on the Singer electric rotary.

FIG. 117a. Position of oil cups on the Singer electric rotary.

General Information: All sewing-machine companies now manufacture electrically-driven machines, both lockstitch and automatic. All types of mechanisms are used, but the rotating principle, of any make, is conceded to produce the

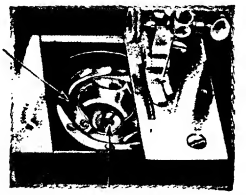
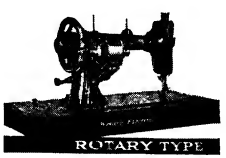


FIG. 117b. Position of oil cup on the Singer electric rotary.

FIG. 118. New Home portable electric.

FIG. 119. Standard portable electric.

largest number of stitches per minute with the greatest efficiency and the greatest smoothness and ease.



A

B

C D

FIG. 120. Eldredge vibrating, rotary, automatic and two-spool types put out in portable form by the Western Electric Company.

The attachments on these machines are the same as for all other machines. Figs. 118, 119, 120, in addition to those already illustrated, show the portable and stationary machines now on the market.

CHAPTER VII

Chain-Stitch Machines and Their Use

44. Chain-Stitch Machine.—The number of chain-stitch machines in use is extremely small compared with the number of lock-stitch machines. There are, however, several

Fig. 121. Willcox and Gibbs automatic, showing the location and names of parts.

companies manufacturing them, and since some schools use them for special work, and a few people prefer them for home use, the directions for their use is given here. One thread only is used on the chain-stitch machine, and there is one type of mechanism used to produce the loop of the interlinking

stitches. The mechanism is built on the rotating principle, as shown in the illustration (Fig. 121).

The parts of the chain-stitch machine are practically the same as on the lock-stitch machines, the notable exception being the tension, which is regulated automatically.

FIG. 122. Method of threading the Willcox and Gibbs machine.

45. Threading the Automatic Machine. — The threading of the chain-stitch machines varies, and two examples are given in Figs. 122, 123, 124. Before starting to thread, raise the needle bar to the highest point in order to raise the tension cap and permit the admission of the thread.

In Fig. 122, the order of threading is as follows: (1) spool pin, (2) thru two staples and hole in the arm known as the pull-off, (3) carrying the thread to the back of the tension and

around from the right to the front, drawing the thread under the tension cap, (4) thru the thread pin on the top of the arm, (5) from right to left thru the wire staple, (6) between the needle bar and the take-up, pressing it into the opening in the top of the take-up, (7) down thru the thread pin on the face, and (8) thru the eye of the needle from left to right.

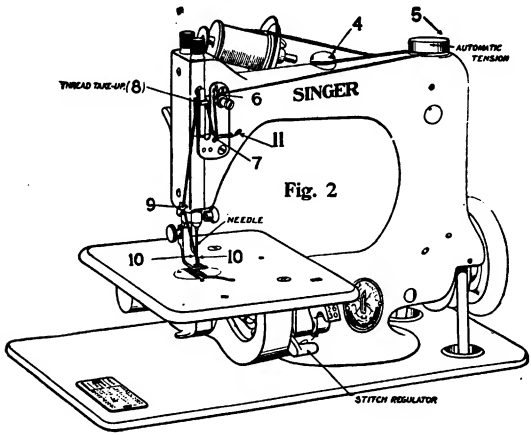


FIG. 123 Method of threading the Singer—front view.

In Figs. 123, 124, the order of threading is as follows: (1) spool pin, (2) into eyelets *1*, *2* and *3* on the back of the machine, (3) from back to front into the thread eyelet on the middle top of the arm, (4) under the tension cap from left to right, (5) to the front of the head thru two thread guides, (6 and 7) into the take-up, (8) carrying the thread between the spring and the small post, down the face of the machine into a thread guide, (9) thru the needle, and (10) from left to right.

46. Directions for Stitching.—Stitching on a chain-stitch is quite different from stitching on a lock-stitch machine: (1) Raise the needle to the highest point, being sure there is a length of thread at least four inches beyond the eye of the needle. (2) Raise the presser foot and place the work

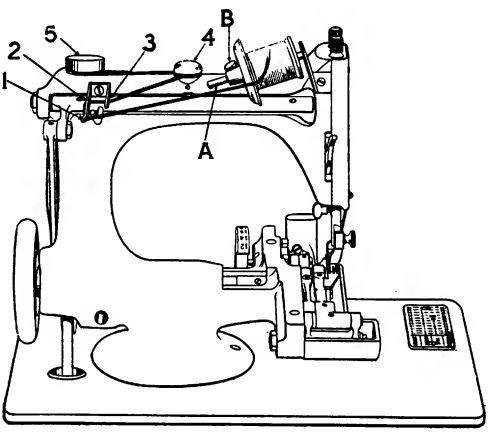


FIG. 124. Method of threading the Singer—rear view.

in position for sewing. (3) Draw the thread from the eye of the needle into the slot at the right of the presser foot, under the presser foot and to the left. (4) Lower the presser foot, being sure the thread is held between the presser foot and the cloth. If the thread is not held down by the presser foot, it must be held securely, but not too tightly, by the left hand until several stitches have been taken.

To turn a corner (*a*), *raise the needle to the highest point*, (*b*) raise the presser foot, (*c*) turn the material to the desired position, being careful to readjust the work so that the first

stitch shall enter at the proper distance from the last, and *d*) lower the presser foot and proceed.

The stitching on a chain-stitch machine must always be fastened carefully at the end of a seam or in the material, as

FIG. 125. Table of needle sizes, shield and handle of stitch regulator.

the case may be. In *all cases*, remember that the position of the needle controls the release of the tension and thus the release of the thread. For this reason, always stop with the needle at its *highest point.*

To fasten at the end of a seam (1) sew *two* stitches beyond the seam; (2) with the left hand, catch the thread between the needle and the thread guide and draw thread from the spool; (3) with the right hand, draw the extra thread thru the eye of

the needle; (4) then draw upward and away from the work until the thread breaks; (5) lift the presser foot and (6) draw the work away or to the back, and the end of the thread will be drawn thru the loop; (7) pull the end of thread to tighten the knot.

To fasten the stitch in the work, (1) stop with the needle in the work; (2) hold the work firmly with the fingers; (3) raise the presser foot, and (4) take one stitch in *the last hole* made; (5) then break the thread close to the material, and (6) draw the material to the back as before for finishing.

When a seam is to be trimmed after stitching, either turn the work and re-stitch a short distance or use a needle and draw the cut end of the thread thru the loop of the last stitch. This, of course, would need to be done as soon as the seam has been trimmed.

Good stitching depends upon a number of points, all of which must be observed. There will be found upon the cloth plate a table showing the size of needle, the length of stitch, and the corresponding size of silk or cotton (Fig. 125). (1) Select the size of the silk or cotton to be used, and then (2) consult the table for the correct size of needle and the corresponding stitch. The number of the needle is stamped upon the shank. Beside the table of relative sizes will be found a small shield with a slot in the center, thru which appears the number of stitches to the inch. The stitch regulating lever is under the table on the cloth plate and directly in the front. To regulate the stitch (3), move the lever up and down until the correct number of stitches to the inch appears.

A *special glace thread* should be used on the chain-stitch machine, tho ordinary thread is sometimes used. Brooks' Glace

is considered the best thread for the purpose, and usually gives good results. In any case, care must be taken not to use a soft finished thread, as it has a tendency to work rough or break.

When selecting the thread or silk, it should be remembered that a much finer thread should be used in machine-sewing than in hand work, usually three or four sizes. The following table will be found useful:

Class of Work	Number of Thread	
	Cotton	Silk
For bleached muslin, shirting, etc.	70 to 90	.....
Dressmaking	60 to 80	O or A
For light woolen clothing, flannels, etc.	60 to 80	.....
For heavy woolen clothing	40 to 60	.....
For fine linens	100 to 150	.....
For fine lawns, nainsooks	120 to 200	.....
For embroidery*	.....	E or F
For hemming	.....	000
For braiding	80	0

*When threading machine for embroidery, use the embroidery spring just before threading into the take-up.

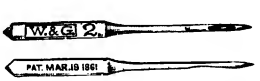


FIG. 126. Needles shown full size.

FIG. 126a. Wrench for setting needles.

47. To Set a Needle.—Lower the presser foot and raise the needle bar to its highest point. With wrench, loosen the needle set-screw and remove old needle. Place groove side of needle toward the left and insert. Push into position with the wrench and tighten the set-screw (Figs. 126, 126a-b-c, and 127).

48. To Clean and Oil the Machine.—The same general directions for cleaning the machine apply to the chain-stitch

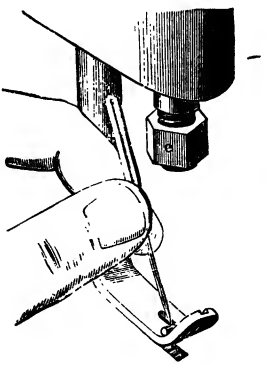


FIG. 126b. Placing the needle.

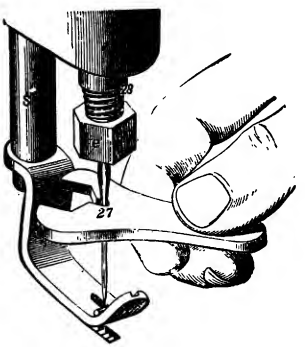


FIG. 126c. Use of wrench to push the needle into place.

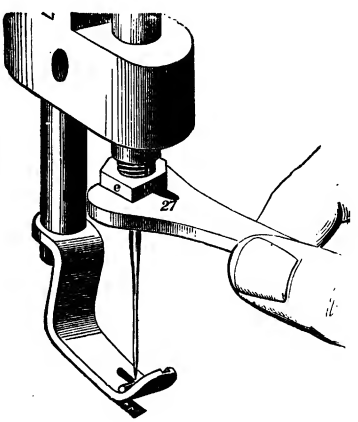


FIG. 127. Tightening the set-screw.

machine, the chief difference being the fact that there is no shuttle race to remove and clean. Remove thread, needle, presser foot, and throat plate, and brush and wipe thoroly.

Occasionally, the machine should be removed from the table and cleaned underneath. To do this, turn the thumb-screw and turn the head back. Turn the cap back and clean with the brush and cloth. Gummed oil should be removed by kero-

FIG. 128. Oil cups on the Willcox and Gibbs sewing machine.

sene or gasoline, as in the lock-stitch. After cleaning and wiping, oil at the following points (Fig. 128): (1) needle bar in two places; (2) presser-foot bar at each bearing, there being two; (3) needle-bar screw; (4) presser-foot lever in oil hole; (5) looping mechanism thru holes in the cloth plate; (6) shaft, the oil holes being to the right near the wheel; (7) connecting rod, lower and upper end; (8) tension rod.

The stand requires oiling in several places, at each of which oil holes will be found (Fig. 129): (1) Upper and lower con-

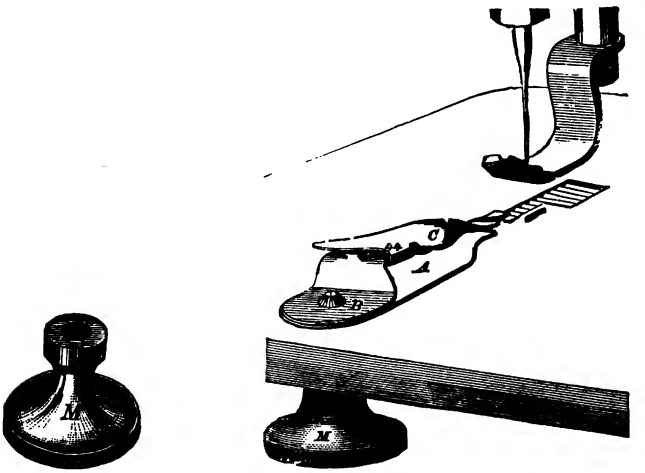
nection of the pitman; (2) bearings at each end of the treadle; (3) center hub of drive wheel; (4) crank hub of drive wheel. Bring the heel or inside edge of the treadle down to its lowest point in order to bring the oil holes in the hub into the most convenient position for oiling.

FIG. 129. Oil cups on the standard of the automatic machines.

The machine should be oiled every day if in constant use; otherwise, oil before stitching. Always run the machine free for a few minutes after each oiling in order to work the oil into the bearings. Take care to raise the presser foot before doing this. Wipe carefully all excess oil from every part of the machine, especially around the oiling points on the upper part of

the machine. *Never put oil in or about the automatic tension.*

49. Cautions to Beginners.—In case of trouble, *look first* to the *threading*; then examine the needle. A perfect needle is an essential, and a blunt point or bent needle will never do satisfactory work.



Hemmer Nut. Hemmer, attached ready for use.

FIG. 130. Hemmers used on the automatic machine.

Thread wound on the looper is caused (*a*) by starting without holding the end by hand or by fastening it under the presser foot at the beginning of the seam; (*b*) by starting with the presser foot up, or (*c*) by not having the right length stitch for the thread being used. When this happens, lower the cap, and, with the points of the scissors, cut the thread and remove the ends (Fig. 121).

If the tension does not work properly, it may be due to a knot or kink in the thread. In such a case (*a*) the top of the machine must be removed, and (*b*) placed back on the table

with the needle bar raised to its highest point; then (*c*) with a fine needle, push the washers in the tension apart and (*d*) pick out the thread (Fig. 121).

FIG. 131. Method of inserting the cloth in the hemmer.

Never force the machine backward to raise the needle, especially at the end of a seam, as it will leave the last stitch unlocked. Also, do *not* run the machine on the cloth for more than two stitches at the end of the seam, as this practice, when continued, will ruin the feed by dulling the fine edges of the teeth.

50. Attachments.—The chain-stitch machines use about the same list of attachments as the lock-stitch machines, the chief point of difference being the fact that care must be used to remember which is to be the finished side when completed.

FIG. 132. Method of holding the cloth when nearing the end of the hem.

FIG. 133. Hemmer for heavy material.

The attachments are usually screwed to the cloth plate instead of being inserted in the presser-foot slot as on the lock-stitch machines.

51. Hemmers.—There are hemmers for varying widths of hems and for varying purposes. Pass the edge of the mate-

rial to be hemmed into the opening between the blades *B* and *C*, (Fig. 131). The fold rolls *under* instead of *over* as on the hemmers for the lock-stitch machines. With a pin or a needle,

FIG. 134. Method of beginning the wide hem.

push the material forward until the edge is under the needle. Lower the presser foot and stitch, being careful to keep the edge of the material against the turn of the hemmer (*44*, Fig. 131). Special care must be exercised when nearing the end of the hem to prevent its pulling away from the scroll of the hemmer.

Lace may be sewed on while the hem is being stitched by inserting the lace between the base and the blade of the hemmer after the hem has been started (*A* and *C*, Fig. 132). The linen, or flannel hemmer (Fig. 133) makes a quarter-of-an-inch hem and is especially adapted for heavy materials.

FIG. 135. Method of holding the material when nearing the end of the cloth.

It is absolutely necessary that all edges to be hemmed should be cut instead of torn. Care must be exercised that the edge is not stretched. The hemmers have a tendency to retard the material so that the stitch regulator should be set forward one stitch to keep the length of the stitch uniform thruout the work.

When using the wide hemmers, the material must be creased the width desired when finished, plus enough to make the first turn, usually one-eighth of an inch. The work is then placed in the hemmer, entering the edge of the goods under

the upper blade *I* (Fig. 134). The edge of the cloth is kept against the turn (*52*, Fig. 134) of the upper blade while the stitching is being done. The stitching guide (*A*, Fig. 135) is

FIG. 136. Method of inserting the material when felling a seam.

used advantageously in this case, since it aids in keeping the width of the hem even.

The narrow hemmer can be used in stitching the second seam of a flat fell seam (Figs. 136, 137). Lay the two edges of the seam together, the wider side entering the hemmer blades in the same manner as for a narrow hem. If the hemmer does

not turn in all the raw edge, trim the seam narrower.

52. Ruffler.—Gathering may be done in either of two ways—with the foot gatherer or the ruffler, as preferred (Figs. 138 and 139). Slip the foot gatherer on the presser foot, as

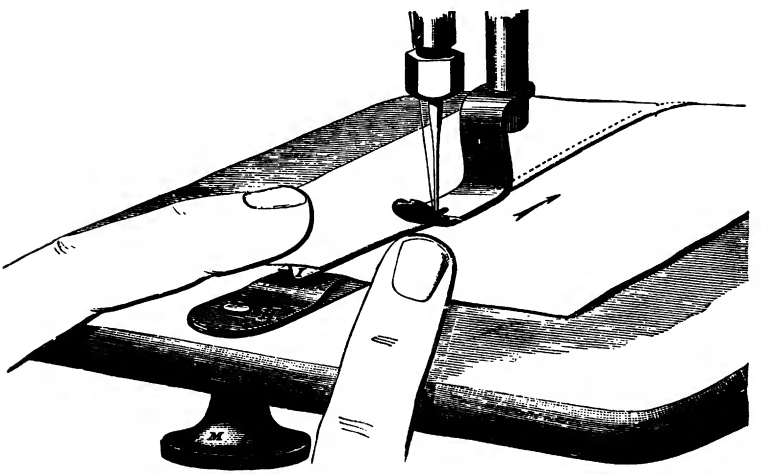


FIG. 137. Method of holding the material when nearing the end of a fell seam.

shown in Fig. 138, and thread the machine, omitting the use of the pull-off and threading direct from the spool into the groove between the washers of the tension; then to the thread pin (*3*, Fig. 138); then continue as usual.

The amount of fullness desired is regulated by the length of stitch, increasing to add fullness and decreasing to lessen fullness; or by winding the thread two or three times around the tension. The amount of fullness depends upon the texture of the material as well as upon the length of stitch and tension of the thread. When gathering chiffon or net, thread as for

regular stitching and make *two* turns around the tension.

The ruffler is attached to the plate with the hemmer nut, and the hook is slipped into the hole in the arm by pressing the spring to the right, in order to pass behind the arm (Fig. 139).

FIG. 138. Foot gatherer and method of threading for gathering.

The amount of fullness is regulated by the thumb-regulating screw, turning to the right to increase fullness, and turning to the left to decrease fullness. This ruffler will do the same work as any other ruffler. For further information, see directions for the lock-stitch machine ruffler.

The heading of the ruffle may be varied by moving the guide as far to the right from the needle as the width of heading desired.

53. Tucker.—The tucker is fastened to the plate with a nut, and the sliding hook is slipped around the needle bar just below the needle screw nut. The tuck guide is always

FIG. 139. Method of using the ruffler.

set for tucks less than one-eighth of an inch before the tucker leaves the factory. To make a wider tuck, close the opening in the guide by swinging the movable part of the guide to the left; then locking it by pushing the small lever to the left,

FIG. 140. Tucker with guide adjusted for wide tucks.

FIG. 140a. Method of adjusting the guide for narrow tucks.

(Fig. 140a). Set the guide to the right of the needle the desired width of the tuck; then loosen the nut and move the creaser twice this distance for tucks without a space between. Addi-

FIG. 141. The quilter.

tional space must be added in proportion to the amount of space desired between tucks. See directions for the use of paper and pencil when setting tucker on the lock-stitch machine.

Be careful to keep the tucks just stitched from between the marker and creaser, since uneven marking will be caused by the added thickness of material.

54. Embroidery.—Chain-stitch embroidery may be done by the use of a No. 4 needle and E and F silk. Thread the machine as usual, but pass the silk from back to front thru the loop of the embroidery spring *after* passing thru the staple (*4*, Fig. 124), and *before* threading thru the take-up (*5*, Fig. 124). The use of the embroidery spring provides extra thread so that the stitch will be sufficiently loose for ornamental work. If the work has a tendency to pucker, as it may on fine material, shorten the stitch to 13 or 14.

The automatic machine attachment box contains a quilter and a braider; a corder foot, and a fringing needle may be purchased extra.

INDEX

INDEX OF ILLUSTRATIONS